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# U.S. STRATEGIC DOCTRINE

## HEARING

BEFORE THE

## COMMITTEE ON FOREIGN RELATIONS
## UNITED STATES SENATE

NINETY-SEVENTH CONGRESS

SECOND SESSION

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DECEMBER 14, 1982

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# U.S. STRATEGIC DOCTRINE

TUESDAY, DECEMBER 14, 1982

UNITED STATES SENATE,
COMMITTEE ON FOREIGN RELATIONS,
*Washington, D.C.*

The committee met, pursuant to notice, at 10:40 a.m., in room 4219, Dirksen Senate Office Building, Hon. Charles H. Percy (chairman of the committee) presiding.

Present: Senators Percy, Boschwitz, Pressler, Pell, Biden, Glenn, Sarbanes, Tsongas, and Dodd.

The CHAIRMAN. Secretary Weinberger, last week your counterpart in the Soviet Union, Defense Minister Ustinov, delivered a major but somewhat bombastic speech in which he declared that deploying the MX missile in the Dense Pack basing mode would be "a gross violation" of the two SALT accords. He also warned that if we go forward with the MX, the Soviets would deploy a matching missile.

I must say that I was very surprised and perplexed by both these statements. When Ambassador Watson, Mr. Robert Galvin and I met Marshall Ustinov and his joint chiefs of staff in a 3-hour meeting in the Kremlin 2 years ago, Marshall Ustinov assured me that the Soviet Union would agree to any MX basing plan as long as it were verifiable.

Just to make sure my recollection of his remarks was correct, I checked the transcript of his meeting, and it confirms that he said, "With reference to the MX, you may take any basing method you choose, but it must be verifiable to us."

Now, whatever one thinks about Dense Pack, there is no question the basing mode would be verifiable. It is also patently false for the Soviet defense minister to suggest that the Soviets would not be deploying a new ICBM were it not for the MX. According to my judgment at least, the new ICBM which the Soviets flight tested in October has been under development for a number of years, and it is the one new type which the Soviets repeatedly told us in SALT that they needed for their own modernization reasons.

It is obvious that there is going to be controversy enough here in the United States about the future of the MX without Soviet leaders fueling the fires with such provocative rhetoric. I want to make it very clear to the Kremlin that we are going to decide the MX issue ourselves according to our own national security needs.

Mr. Secretary, this brings me back to Dense Pack. Speaking as one Senator who has tried very hard to follow the zigs and zags of the MX saga, I have to tell you that I am becoming increasingly frustrated, along with many of my colleagues, and concerned about the whole process.

We have had the buried trench proposal, the racetrack plan, and last year the interim silo proposal. Now we have before us a Dense Pack proposal which a majority of the Joint Chiefs of Staff opposed sending to the President. It is my political judgment that Dense Pack as it has been presented to Congress thus far is simply not going to fly.

Your opening statement focuses just on Dense Pack, but as you know, President Reagan has agreed to reconsider the whole basic question, and has invited congressional ideas on possible alternatives, and I commend him for this.

I would, therefore, hope that you will express your own views on two possible options for where we may go from here. First, I would ask whether you would favor deploying a small number of MX missiles in existing silos while we continue to search for a more permanent, survivable basing mode. This, after all, is the approach which the President proposed last October and one which the President on Friday said is still favored by all but one of the Joint Chiefs of Staff.

This approach would allow us to move ahead with the missile which is crucial, in the judgment of many, if we are to succeed in the START negotiations while we go back to the drawing board on a long-term basing plan. It would also be fully compatible with SALT II, cost half as much as Dense Pack, and would seem to make a lot more sense than putting the missiles in warehouses.

The second option is to hold off for another year before we move from the R&D stage to the production stage. Last month we had a setback when an MX engine exploded during a test firing, and some Members of Congress during the debate in the House claimed the program is being rushed to meet an unrealistic deployment deadline. If we held the missile in R&D in fiscal year 1983 we would have another year to consider alternatives to Dense Pack.

I would hope that you would comment on these two options in your opening remarks.

Senator Pell.

Senator PELL. Thank you, Mr. Chairman.

I join in welcoming the Secretary. I regretted seeing in the press that he has been working too hard, and I know he has, and I respect him very much as a man, although I do not agree with him usually on issues. I was very disturbed last August 15 to note in the Providence Journal in my home State the Scheer article which talks about a National Security Council paper laying out plans for fighting a nuclear war for up to 6 months and stating as an acceptable consequence the loss of no more than 20 million American lives.

I was also disturbed to see the lexicon of words that is used by the administration spokesmen state that there could be no winners in a nuclear war, which is what I have always understood since we started out in this competition with the Soviet Union and they with us, but now there is a new word that has crept into the lexicon, and that is one side or the other can "prevail."

This, as you know, disturbs me and is one of the reasons why last August I requested this meeting. The Secretary of Defense and I had an exchange of correspondence on this issue, but I am still not satisfied. So I would hope that we could clarify for the American people what the real doctrine is. Is 20 million an acceptable loss? Is the idea

that one side could prevail over the other correct? Or are we still, as I hope we are, of the view that in the case of a general nuclear exchange there can be no winners?

In this regard, Mr. Chairman, I would like to have inserted in the record the article from the Providence Journal of last August 15, and also the exchange of correspondence between the Secretary and me on this subject.

The CHAIRMAN. Without objection they will be entered in the record.

[The material referred to follows:]

[From the Providence Journal, Aug. 15, 1982]

6-MONTH NUCLEAR WAR PLAN IS SUBMITTED TO REAGAN

PENTAGON STRATEGISTS ENVISION VICTORY WITH LOSS OF NO MORE THAN 20 MILLION LIVES

(By Robert Scheer)

WASHINGTON.—On the orders of the Reagan administration, the Pentagon completed a strategic master plan last week to give the United States the ability to win a protracted nuclear war with the Soviet Union.

The document was delivered to the National Security Council and is awaiting President Reagan's approval.

It lays out plans for fighting a nuclear war for up to six months and it labels as an "acceptable consequence" the loss of "no more than 20 million" American lives.

The directive is part of a top secret national security decision document that was drawn up in the fall of 1981 to supersede a Carter administration directive.

Sources familiar with both classified documents report that Mr. Reagan's strategic doctrine differs from Carter's in that it contains specific plans for launching and maintaining a protracted nuclear war.

No U.S. administration has formulated a detailed plan for waging a long-term nuclear war until now, those sources said.

The Pentagon's strategic master plan was to have been sent to the National Security Council for approval in June. However, it was delayed because of the public disclosure of another secret Defense Department document, the annual defense guidance statement.

Portions of that statement, which the Pentagon draws up each year projecting its needs for the next five years, were leaked to the New York *Times* and caused considerable embarrassment for the administration.

The newspaper reported that the annual guidance plan assumed that "protracted nuclear war is possible" and that "American nuclear forces must prevail and be able to force the Soviet Union to seek earliest determination of hostilities on terms favorable to the United States."

Administration insiders report that the new strategic master plan approved last week is more detailed and more controversial in its advocacy of nuclear warfare than the annual Defense Department guideline reported earlier.

Most significantly, it would carry the imprimatur of the President and his National Security Council, while the annual guidance plan is an internal Pentagon document.

The new master plan concentrates exclusively on the possibilities of strategic nuclear war and reportedly aims at providing more of a "how-to" treatment of the subject. For example, the new plan devotes considerable space to the matter of destroying enemy political centers and command centers while preserving similar U.S. centers.

The Reagan administration has budgeted $18 billion for the purpose of securing U.S. military command, control and communication, or C-3 as it is known to planners.

The implications of the shift in strategic thinking about nuclear war were spelled out by Gen. James W. Stansberry, commander of the Air Force Electronics Systems Division, who told an Air Force conference that:

"In previous years the concept for C-3 was that it only had to be able to get off a launch of U.S. strategic weapons in response to a first strike before damage was unacceptable. The idea that there was no way to win a nuclear war exchange sort of invalidating the need for anything survivable. There is a shift now in nuclear weapons planning."

The notion that nuclear wars can be fought on a limited and survivable basis has had growing support in the past decade. Increasingly accurate missile technology and sophisticated means of communications have produced the confidence in some quarters that nuclear war need not be fought as one spasmodic episode with little but radioactive rubble to show for the effort.

The result has been a push for rejecting a nuclear strategy based on the idea of a nuclear war as one spasmodic event, requiring as a deterrent only enough power on each side to assure the destruction of the other.

In the nuclear war-fighters' view, which Mr. Reagan's National Security Council appears to accept, a nuclear war might be fought over a period of several months with selective strikes at primarily military targets. At the end, they believe, one side could emerge victorious, with enough of its resources and population intact to maintain its viability as a nation.

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THE SECRETARY OF DEFENSE,
*Washington, D.C., August 23, 1982.*

Hon. CLAIBORNE PELL,
*U.S. Senate,*
*Washington, D.C.*

DEAR SENATOR PELL: I am increasingly concerned with news accounts that portray this Administration as planning to wage protracted nuclear war, or seeking to acquire a nuclear "warfighting" capability. This is completely inaccurate, and these stories misrepresent the Administration's policies to the American public and to our allies and adversaries abroad.

It is the first and foremost goal of this Administration to take every step to ensure that nuclear weapons are never used again, for we do not believe there could be any "winners" in a nuclear war. Our entire strategy aims to deter war of all kinds, but most particularly to deter nuclear war. To accomplish this objective, our forces must be able to respond in a measured and prudent manner to the threat posed by the Soviet Union. That will require the improvements in our strategic forces that the President has proposed. But it does not mean that we endorse the concept of protracted nuclear war, or nuclear "warfighting." It is the Soviet Union that appears to be building forces for a "protracted" conflict (the doctrine of Zatyazhnaya Voyna).

The policy of deterrence is difficult for some to grasp because it is based on a paradox. But this is quite simple: to make the cost of nuclear war much higher than any possible "benefit" to the country starting it. If the Soviets know in advance that a nuclear attack on the United States could and would bring swift nuclear retaliation, they would never attack in the first place. They would be "deterred" from ever beginning a nuclear war.

There is nothing new about our policy. Since the awful age of nuclear weapons began, the United States has sought to prevent nuclear war through a policy of deterrence. This policy has been approved, through the political processes of the democratic nations it protects, since at least 1950. More important, it works. It has worked in the face of major international tensions involving the great powers and it has worked in the face of war itself.

But for deterrence to continue to be successful in the future we must take steps to offset the Soviet military buildup. If we do not modernize our arsenal now, as the Soviets have been doing for more than 20 years, we will, within a few years, no longer have the ability to retaliate. The Soviet Union would then be in a position to threaten or actually to attack us with the knowledge that we would be incapable of responding. We have seen in Poland, in Afghanistan, in Eastern Europe and elsewhere that the Soviet Union does not hesitate to take advantage of a weaker adversary. We cannot allow the Soviet Union to think it could begin a nuclear war with us and win.

This is not just idle speculation. The Soviet Union has engaged in a frenzied military buildup, in spite of their economic difficulties. They have continued to build greater numbers of nuclear weapons far beyond those necessary for deter-

rence. They now have over 5,000 nuclear warheads on ICBMs compared to about 2,000 only five years ago. They have modified the design of these weapons and their launchers so that many of their land based missiles are now more accurate, more survivable, and more powerful than our own. They have also developed a refiring capability that will allow them to reload their delivery systems several times. They have elaborate plans for civil defense and air defense against any retaliation we might attempt. And finally, their writings and military doctrine emphasize a nuclear war-fighting scenario. Whatever they claim their intentions to be, the fact remains that they are designing their weapons in such a way and in sufficient numbers to indicate to us that they think they could begin, and win, a nuclear war.

In the face of all this, it is my responsibility and duty as Secretary of Defense to make every effort to modernize our nuclear forces in such a way that the United States retains the capability to deter the Soviet Union from ever beginning a nuclear war. We must take the steps necessary to match the Soviet Union's greatly improved nuclear capability.

That is exactly why we must have a capability for a survivable and enduring response—to demonstrate that our strategic forces could survive Soviet strikes over an extended period. Thus we believe we could deter any attack. Otherwise we would be tempting them to employ nuclear weapons or try to blackmail us. In short, we cannot afford to place ourselves in the position where the survivability of our deterrent would force the President to choose between using our strategic forces before they were destroyed or surrendering.

Those who object to a policy that would strengthen our deterrent, then, would force us into a more dangerous, hairtriggered posture. Forces that must be used in the very first instant of any enemy attack are not the tools of a prudent strategy. A posture that encourages Soviet nuclear adventurism is not the basis of an effective deterrent. Our entire strategic program, including the development of a response capability that has been so maligned in the press recently, has been developed with the express intention of assuring that nuclear war will never be fought.

I know this doctrine of deterrence is a difficult paradox to understand. It is an uncomfortable way to keep the peace. We understand deterrence and accept the fact that we must do much more in order to continue to keep the peace. It is my fervent hope that all can understand and accept this so that we can avoid the sort of sensationalist treatment of every mention of the word "nuclear" that only serves to distort our policy and to frighten people all over the world. Our policy is peace, and we deeply believe that the best and surest road to peace is to secure and maintain an effective and credible deterrent.

The purpose of U.S. policy remains to prevent aggression through an effective policy of deterrence, the very goal which prompted the formation of the North Atlantic Alliance, an alliance which is as vital today as it was the day it was formed.

Respectfully,

CASPAR W. WEINBERGER.

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WASHINGTON, D.C., *September 8, 1982.*

Hon. CASPAR W. WEINBERGER,
*Secretary of Defense, Department of Defense,*
*The Pentagon, Washington, D.C.*

DEAR MR. SECRETARY: Thank you for your thoughtful letter of August 23, 1982 concerning the news accounts portraying the Administration as planning to wage protracted nuclear war or seeking to acquire a nuclear "warfighting" capability.

In this regard, you were quoted in the Washington Post of August 25 as saying that "we do not believe there could be any winners in a nuclear war." The same article went on to state that, according to an Administration guidance document, in the event of a nuclear war "the United States must prevail" and that the United States must have nuclear forces that could hit the Soviet Union "throughout a protracted conflict period and afterward."

The quotations from the guidance document appear to me to contradict your statement that a nuclear war is not winnable. To my mind, plans to wage a protracted nuclear war with the object of prevailing suggests that the concept of a winnable nuclear war underlies our nuclear strategy. Such a concept, in my view, would weaken deterrence. I would appreciate it if you would let me know what is

meant by the term "prevail" and how that can be reconciled with your statement that a nuclear war is not winnable.

This is a matter of obviously very real and great concern to me, and it is for this reason that I write this letter.

All best wishes,

Ever sincerely,

CLAIBORNE PELL.

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[From the Washington Post, Aug. 25, 1982]

WEINBERGER LOBBIES EDITORS ON WAR POLICY

(By George C. Wilson)

The Pentagon said yesterday that Defense Secretary Caspar W. Weinberger has taken the unusual step of writing editors around the world in hopes of convincing them that the Reagan administration is not planning to fight a nuclear war.

He complains in the form letters mailed Monday to 30 editors in this country and 40 abroad, primarily in NATO countries that are protesting putting additional American nuclear weapons on their soil, that the administration's nuclear policy has been misrepresented in the press.

One Weinberger associate said the letter has part of the secretary's effort to focus attention on one subject at a time and communicate the administration's views as directly as possible, rather than risk being deflected or misinterpreted in wide ranging news conferences.

Defense Department records show that Weinberger has held only one general news conference at the Pentagon in his 19 months there, but has appeared on television in the United States 43 times in the same period.

His dislike for the wide open news conference was underscored Friday. President Reagan and Secretary of State George P. Shultz appeared before reporters to announce that 800 Marines were going into Lebanon, but Weinberger left his department's briefing to spokesman Henry E. Catto Jr.

"This is the kind of nuts and-bolts thing that I don't think is appropriate for him to have to worry about," Catto said when asked Friday why Weinberger "didn't hold this briefing."

However, Weinberger appeared on TV talk shows Sunday and Monday to discuss the situation in Lebanon.

Catto said yesterday that Weinberger's letters on administration nuclear policy are designed to counter the printed misinterpretations of that policy, particularly in Europe "from people clearly on the left."

In his form letter, which has a "Dear Sir" salutation, Weinberger opens with: "I am increasingly concerned with news accounts that portray this administration as planning to wage protracted nuclear war or seeking to acquire a nuclear war-fighting capability.

"This is completely inaccurate, and these stories misrepresent the administration's policies to the American public and to our allies and adversaries abroad. It is the first and foremost goal of this administration to take every step to ensure that nuclear weapons are never used again, for we do not believe there could be any winners in a nuclear war."

Weinberger wrote that Reagan is strengthening the nation's nuclear forces as part of his basic strategy of keeping the Soviets from pushing the button by making "the cost of nuclear war much higher than any possible benefit to the country starting it. * * * There is nothing new about our policy."

To match the growing Soviet nuclear arsenal, Weinberger said that "we must have a capability for a survivable and enduring response, to demonstrate that our strategic forces could survive Soviet strikes over an extended period." The words "capability" and "could" are underlined.

The controversy Weinberger is trying to still stems from the way some newspapers interpreted his secret guidance to the military services. The guidance was obtained by The Washington Post and The New York Times. The Times article on May 30, which drew a Soviet protest, was headlined "First Strategy for Fighting a Long Nuclear War."

The guidance for fiscal 1984 through 1988 states that "should deterrence fail and strategic nuclear war with the U.S.S.R. occur, the United States must pre-

vail and be able to force the Soviet Union to seek earliest termination of the hostilities on terms favorable to the United States."

This requires, among other things, nuclear forces that could hit the Soviet Union "throughout a protracted conflict period and afterward," according to the guidance.

Weinberger has complained repeatedly to congressional committees that the administration's policies have been misinterpreted by the press.

The Pentagon confirmed yesterday that the secretary's only wide open Pentagon news conference was on Feb. 3, 1981. Catto said yesterday that, considering how willing Weinberger has been to meet with reporters individually and to appear on television, as well hold news conferences outside the Pentagon, "his availability has been terrific."

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THE SECRETARY OF DEFENSE,
*Washington, D.C., September 30, 1982.*

Hon. CLAIBORNE PELL,
*U.S. Senate,*
*Washington, D.C.*

DEAR SENATOR PELL: Thank you for your September 8, 1982, letter requesting clarification of my statements on U.S. nuclear policy.

I regret that there is any confusion on this issue. My intent was, and remains, to stress our policy of deterrence. As you are aware, deterrence has been the fundamental objective of U.S. nuclear policy for almost four decades. Similarly, the fundamental reason for the existence of our nuclear forces has been, and remains, to contribute to the deterrence of war, and, specifically, to deter nuclear war. In this regard, our historical objective of deterrence has been founded on our belief that there could be no winners in a nuclear war. We are aware of the terrible consequences which a nuclear war would hold for the American people, and thus, we are under no illusion that a nuclear war would be anything less than an absolute catastrophe.

Unfortunately, we are faced with an adversary who does not necessarily share our abhorrence of war, even nuclear war; in fact, there is ample evidence that the Soviets have a very different view. Accordingly, our deterrent posture must be based on what deters the Soviets, because it is their perception, not ours, on which we must form the basis of our deterrent posture. To this end, it has been our belief that deterrence is best served by the possession of forces and plans for their use, which make Soviet assessments of possible war outcomes, under any contingency, so uncertain and dangerous as to create strong disincentives for initiating attack or aggression against us to our allies. This requires that we be convincingly capable of responding in such a way that they would be denied their political and military objectives and, hence, could not achieve their war aims. In other words, we must have a doctrine and plans for the use of our forces which make clear to the Soviet leaders the hard reality that no course of aggression by them that led to the use of nuclear weapons could lead to victory—however they might define it. Firmly convincing the Soviet leaders of these fundamental truths remains the surest restraint against their being tempted to use their nuclear forces for aggression against us and our allies.

It must be apparent, therefore, that U.S. contingency planning for nuclear forces and strategies to serve deterrence also must envision the possible employment of nuclear weapons should deterrence fail. Given the large and varied forces of the Soviet Union, and the wide range of possible ways in which they could use them, it would be militarily, politically and morally unsound to confine the President to resorting either to capitulation or massive retaliation. The consequences for the United States and our allies in either case are unacceptable. Accordingly, our policy requires that, if necessary, we prevail in denying victory to the Soviets and in protecting the sovereignty and continued viability of the United States and of the Western democracies as free societies with fundamental institutions and values intact. There is no contradiction, however, between deterrence of war and planning to employ nuclear weapons to deny victory to the Soviets if deterrence fails. Similarly, there is no contradiction between our view that there could be no winners in a nuclear war and our planning to prevail, if war is forced upon us, in denying victory to the Soviet Union. The confusion which arises from our policy statements about winning and prevailing is thus

misguided. It should be apparent, that if our forces cannot be used effectively, if necessary, neither can they credibly deter. Similarly, if we cannot convince the Soviet leaders that we could prevail in denying their objectives, they would not be deterred. More important, deterrence would be based on a hollow threat which, if ever tested, would invite catastrophe.

In summary, I must ask you to consider the alternatives from which we must choose as a basis for continued nuclear deterrence. Our national security cannot rest solely on our abhorrence of nuclear war and the fear of its consequences; we are confronted by a hostile power which holds a different view. Moreover, the stakes are too high and the consequences too grave if we are wrong about deterrence. Our deterrence posture must thus continue to be based on a threat of retaliation which is believable to the Soviet leaders if deterrence fails.

As I noted earlier, my paramount objective is that we will never be faced with the need to retaliate with our nuclear forces. But, if we must, we can, and we will, defend our vital interests.

As I have said on many occasions, it is an uncomfortable way to keep the peace, but for 37 years it has kept the United States and the Soviet Union from war. Our policy seeks peace, and we deeply believe that our nuclear deterrent posture must rest on a foundation of our prevailing and enduring strength.

Sincerely,

CASPAR W. WEINBERGER.

The CHAIRMAN. Mr. Secretary, we would be pleased to hear from you.

Senator BOSCHWITZ. Mr. Chairman, inasmuch as this hearing is a bit late and I may not be able to stay for the period of the questioning, I would like to make a short opening statement, if I may. It also is a reflection of my own frustration that you touched upon in your opening remarks.

It is frustrating to find the heads of some of the services going in different directions. And I should really preface my remarks by saying that I have been quite supportive of the President's defense initiatives. I have voted quite consistently for them, even though I think that the buildup has been somewhat quicker than I would agree with.

Therefore, I must express perhaps my unwillingness to continue along that path and to express it from the standpoint of having some of the frustrations that, when the Chiefs of Staff of the various services cannot agree on something as basic as how to deploy these missiles, a layman such as myself who is expected to know a lot about many subjects and sometimes finds himself very thin in knowledge about some very important subjects; a layman like myself is, therefore, confused.

I am also confused about whether or not we are being very technical with respect to SALT II and whether it was the SALT treaties, SALT I and II, and whether or not there is not a possible violation here other than stretching the technicalities of the treaty. And the same applies to the ABM Treaty.

I think that we have delayed, by and large, too long in the building of missiles. We are perhaps $300 billion behind, at least expenditure-wise, on missile development and missile placement behind the Russians. So, while I do not like to see delays, I would find myself frustrated with this issue and by the apparent disagreement in the defense community with respect to it.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Boschwitz.

Now, Secretary Weinberger.

## STATEMENT OF HON. CASPAR WEINBERGER, SECRETARY OF DEFENSE, ACCOMPANIED BY DR. RICHARD D. DeLAUER, UNDER SECRETARY FOR RESEARCH AND ENGINEERING, AND DR. RONALD LEHMAN, DEPUTY ASSISTANT SECRETARY, POLICY

Secretary WEINBERGER. Mr. Chairman and members of the committee, we appreciate very much as always the opportunity to appear before you and to discuss these critically important matters. I was at a White House meeting with the President this morning; so, I regret being late for the earlier hearing. But I am delighted to have the opportunity to be here now, and I have an opening statement.

I also have a second opening statement, which was prepared for the closed session we were to have had earlier this morning.

Mr. Chairman, you have indicated the shortness of time, and I will ask, if I might, that both statements, be put in the record in full. I would like to highlight one or two points from my statement for this hearing and then turn to the points that you, Senator Pell and Senator Boschwitz just raised to see if I could, in an informal, impromptu sort of way, deal with those points.

The CHAIRMAN. Very good. Without objection, the full statements will be incorporated in the record.

Secretary WEINBERGER. The part I would like to raise at this point in the opening statement is the paragraph which states that the central characteristic of the Soviet strategic forces is an enormous and destabilizing, prompt, hard target kill capability. The United States today has no such capability. It is essential, therefore, that we secure that kind of capability, and it is this basic requirement that has lead to the development of this missile over some 10 years of discussion and debate and through three or four previous administrations.

There are other key points in that statement, and others that I think can be referred to as I try to deal with the points that you have raised. But the MX missile does work to counter this monopoly that the Soviets have developed in strategic weapons. The MX is flexible and it is responsive. It has reliable and real time communications with command authorities, offers alert rates that approach 100 percent and can be maintained at low operating cost. There is no other single strategic system that possesses all these important qualities.

So I would like to have that more or less as a background for my remarks, Mr. Chairman, when we talk about one of the possible options which has been discussed, to move away from a Triad, give up the land-based system and rely on the other two legs of the Triad.

Mr. Chairman, in your remarks you referred to a point that Marshal Ustinov made. I do not find myself in any way surprised that his current speech differs from his earlier commitments or discussions with you. That is more or less a pattern, and I do not find it in any way surprising. I do think there are a couple of interesting points in the talk he made—aside from the intimidating portions—just about the time the NATO meeting began for the NATO defense ministers. Fortunately his remarks had no effect on them.

But he charged that the MX close-spaced basing proposal violated SALT. We have been advised by our counsel and all the arms control

people who have examined the proposal—and they were numerous—that there is no violation of SALT, that this is a system that is not covered in the SALT Treaty. It is a system that provides for the ability to move the missile and its canister about. All of its launch mechanisms are in the canister, and it can be, as I said, picked up and moved from one silo to another silo. So there is no violation of SALT, and we have been assured of that by all of the people who have familiarity with both the treaty and the law involved.

The other point that Marshal Ustinov made and you referred to is even more interesting. He said that if we deployed peacekeeper, the Soviets would go ahead and deploy a matching missile. The problem with that statement, Mr. Chairman, is that the Soviets went ahead and deployed the so-called matching missile 3 or 4 years ago; and the MX is designed to provide us with the capability which the Soviets now have. The Soviets can now destroy the Minuteman system effectively in a first strike, leaving us without an ability to respond and inflict retaliatory damage that they would find too costly to bear and so be deterred. The whole essence of deterrence is lost, and that is why it is essential to regain that deterrent capability for our land-based ICBM force.

That is why I mentioned the particular qualities that are possessed by our ground-based ICBM forces, why it is so essential to continue with them. But it is not true for Marshal Ustinov or anyone else to say that the Soviets would retaliate or respond with new missiles of their own if MX were deployed—they already did that long ago. It is because of these Soviet deployments that we need to have this kind of capability to regain our effective deterrent.

You also asked me to mention the possibility of an alternate proposal or an alternate system deploying a small number of MX missiles in existing Minuteman silos. That, sir, has a familiar ring to it, and it is familiar because it is what the President proposed on October 2, 1981. It is a proposal which the Congress forbade him to pursue. It was not a fence around the funds; it was a flat prohibition preventing the DOD from expending any money to pursue this option. So that was dropped because we, of course, respect the directions of Congress.

We also had another——

The CHAIRMAN. Would, though, Mr. Secretary, if it were left to the administration, would you like the Congress to reconsider that position now, and would you like to put that forward again as a recommendation that we consider?

Secretary WEINBERGER. That is a point I want to take up in some detail with you, sir, and I might as well do it now since you have raised it.

The other part of the prohibition was that we not consider any other mode that involved an airborne deployment of the missile, and that again was a flat prohibition. And while it had never really been thoroughly evaluated, it was no longer taken up or considered.

The third thing that was directed by the Congress was that the President report by December 1, 1982, on the mode he had chosen for permanent basing of the MX. Originally the suggestion or direction was that he do it by July 1, 1983, but it was moved back to December 1, 1982.

That, of course, meant that all of the studies and other evaluations we needed had to be telescoped, accelerated, and hurried to meet that particular date. In the course of doing that however, we did do all of the things that we planned to do over a somewhat longer term in examining the various alternate modes. We also did what the first Townes Commission directed or suggested, and that was to look very carefully at the possibility of a basing mode which takes advantage of the phenomenon called fratricide. As you know, that involves putting the missiles in a narrow, closely spaced basing mode so that the Soviet attack coming in would have to come through a very narrow corridor. We did make these various examinations. We also looked at the possibilities of defending a field.

The proposal that the President made last October 2, was clearly presented many times as an interim proposal to put them in existing silos while we spent more time examining a more permanent mode. We did not have much time under the direction of the Congress to do that, but we made that examination. It led us to the conclusion that a more survivable basing mode was possible in this close-spaced basing mode, not only because of the phenomenon of fratricide but also because it should be more easily defended by a ballistic missile defense system such as we now possess or one that could even be improved.

Incidentally, I might say immediately to try to forestall questions on that point that we were also advised unequivocally that that would not be a violation of the ABM Treaty that permits each side one system. We had previously designated Grand Forks, N. Dak., at the site of our BMD system. We are advised that that can be changed unilaterally and that the one system permitted under that treaty can be deployed to protect this field should that be necessary.

All of these factors led us to the conclusion that to put it in this closely spaced field would be the most survivable method of deploying the MX.

Now the problem with all of this, Mr. Chairman, is, that there is no basing mode that can be recommended to the President that is absolutely invulnerable. We have to blame ourselves largely for that because the Soviets have acquired a degree of accuracy with their missile system, at least in part with technology they took from us, that makes it impossible for them or anyone on either side to have a complete confidence that a field is totally survivable.

Bearing that in mind, we then looked for the one that was the most survivable, knowing that it was perfectly possible to criticize various bits and pieces of any proposal or any system suggested. That, in fact, was why 1 year ago October the President asked for an interim basing of the kind you suggested while we spent time searching for a better solution.

We have spent that time, and we now believe that the close-spaced basing is the proper and most survivable method even though it is possible to find various things that are wrong with it or various vulnerabilities that it has. The important thing is that a very large portion of it would survive a first strike, which would leave us with a retaliatory capability that is the essence of deterrence and would enable us to fulfill our basic goal which is to deter war.

Now you suggested a second alternative—to hold off for another year. Unfortunately, I would find that unacceptable because that would delay further the time when we gain the capability that we do not now have with respect to the ground-based ICBM force. We have spent some 10 years debating and discussing this. About $4.2 billion has been sunk into it already, and I think the time is now long overdue to move forward with its development and its production.

We are very close to production now, and we believe its deployment is essential. Even though we know no solution is perfect—and it is possible to point out various things wrong with every basing mode, we must deploy the MX in the most survivable mode that we believe exists, and that is the one we have recommended to you.

Senator Pell asked about an article by somebody named Scheer that appeared in one of the newspapers. That article contains a vast number of total falsehoods, Senator. The 6-month duration for a protracted conflict is totally wrong. There has not been the slightest suggestion of that by anybody that I know of in the Defense Department or indeed anywhere else. The suggestion that any number of dead is acceptable is a contemptible lie and should be treated as such. There is not the slightest suggestion that there has been any acceptable number of casualties or anything of the kind. It is a figment of that particular writer's imagination, and it is, describable only in the way that I described it.

You and I have had correspondence and discussion about the term "prevailing" and the way in which that fits into the generally accepted belief that a nuclear war is not indeed winnable. We believe that a nuclear war is not winnable. We used to think the Soviets believed that, but we doubt that now. We think they may very well have the belief that they could win a nuclear war by making a first strike.

We think it is very significant that they have added so much to their various defenses, including civil defense. We can debate whether it is effective or not. The important thing is that they are spending about 1 percent of their gross national product on civil defense. Whether it is effective or not is not the point. The point is that they appear to believe that it is effective. They appear to believe that they could protect a large portion of their population and that therefore they would be free to make a first strike. That is something I think we cannot overlook.

Our whole policy is deterrence. Our whole policy is based on the idea that we should do everything we can to deter war. The best way we can deter war is to have sufficient retaliatory capability, both conventionally and strategically.

We believe that the President's proposals to restore the strategic strength of the United States, to modernize, something we have not done effectively for 20 years, is an essential first step in regaining a deterrent capability. That takes a long time, and it is very expensive, although it will never exceed 15 percent of the total defense budget. But it is something that must be done, and that is what the President's program will provide if we stay with it for the number of years required. We will have regained that deterrent strength—not military

superiority, not one more warhead than the Soviets have or one more tank or anything of that kind. We will not be anywhere near that, but what we will have regained will be the retaliatory capability that can preserve deterrence, and that in turn can preserve the peace of the world as it has been now for nearly 40 years between the superpowers. That is our goal. That is what we seek.

We must bear in mind, however, that it is possible that deterrence will fail and that you will get some policies in the Soviet Union in the hands of people who will not bother to count the retaliatory cost and who will not be deterred. Under those circumstances we cannot do anything other than plan—and you would not want me to do anything other than this—to try to deal with that kind of contingency in such a way that does not subjugate the United States. That is essentially what we are trying to do.

Senator Boschwitz raised points with respect to the SALT Treaties and the ABM Treaty. I trust I dealt with the latter two. I have tried to, Senator, in reporting that we have found no violations of any of these treaties in the plans that we have before you.

With respect to the Senator's point on the Joint Chiefs, I think it is important to understand in detail what occurred. First of all, they were fully consulted, as indeed they should be, and as I insisted should be. They were consulted in ample time. They all supported producing and fielding the MX. Some of them did feel that the December 1 deadline forced the President into making a final decision before they would have liked. They would have liked to have had an opportunity to explore all other methods.

Two of them wanted to deploy the missile in the way that you have mentioned, Senator, which has been forbidden by the Congress and which we felt was not, therefore, a viable option. Two supported the plan completely, and one pointed out some problems with it but did not make any specific suggestions. All five said that if the President chose this plan, their objections did not go so deeply that they would oppose it. They would, in fact, support it. They were giving him the benefit of their advice as they are required by statute to do, and they were reporting to Congress the effect of those results, as I think they should do.

If this has created the impression of a lot of disunity or dissension, I think it is a very wrong impression. These are honest, capable people who have risen to the top of their very difficult professions, and they are giving their professional advice, and that advice essentially is that we need the MX; we should deploy it. Some of them would rather have done it in a way Congress has forbidden; two of them think closely spaced basing is exactly right—and that included the chairman—and none of them have objections so deep that they cannot support the system.

So I think that should be quite clear. I do not think there should be any surprise or shock that honest men can have differences of opinions about these basing modes when, as we all know, the real problem is that there is no system that is invulnerable. What we seek is the most survivable system we can find.

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Now in trying to answer those two questions I perhaps have gone much longer than you would have liked me to, but I have tried to deal with all three statements that were made, and I would be delighted to try to take questions as you wish.

[Secretary Weinberger's prepared statement follows:]

PREPARED STATEMENT OF HON. CASPAR W. WEINBERGER

THE PEACEKEEPER MISSILE: STRATEGIC, FOREIGN POLICY, AND ARMS CONTROL IMPLICATIONS

Mr. Chairman, I wish to thank the Committee for the opportunity to come before you to discuss the strategic, foreign policy and arms control implications of the Peacekeeper missile in a closely spaced basing deployment. Since the end of World War II and the dawn of the nuclear age, this nation's nuclear strength has been put to the service of but one goal—deterrence. Put simply, the effectiveness of our deterrent capability has been measured by its ability to remove any reasonable expectations which a potential enemy might have of deriving military, political or economic gain from the use of nuclear weapons; one might think this would be an easily achievable end. In the early years, when the United States enjoyed a virtual nuclear monopoly, and then a vast superiority in nuclear arms over the Soviet Union, it was. But in the years since that time the world and its realities have changed significantly and the maintenance of a secure and stable deterrence is no longer so easily assured.

From the beginning, Soviet nuclear doctrine has been fundamentally different from U.S. doctrine in that it sees nuclear conflict as merely a more destructive form of conventional conflict. Put another way, Soviet doctrine has always asserted the possibility of fighting and winning a nuclear war by preemptively destroying opposing strategic nuclear capability and limiting damage to the Soviet Union. During the years of American nuclear superiority, this Soviet sentiment was more an expression of ambition than a reflection of a policy that was in harmony with actual strategic capability. Unfortunately, this policy is no longer just a hollow ambition. Today it serves as the guiding hand for a powerful strategic force that is the result of a massive strategic build-up that began in the 1960's, reached full stride in the 1970's, and continues unabated to this day. Specifically, the Soviet Union has devoted and widely deployed large, highly accurate, and survivable intercontinental nuclear weapons and has hardened and proliferated its strategic command, control and communications facilities. These two developments have dramatically increased the vulnerability of U.S. strategic forces—especially ICBMs—to Soviet attack while reducing the vulnerability of Soviet forces to U.S. retaliation.

The central characteristic of this Soviet strategic force is an enormous and destabilizing prompt hard target capability. The United States today has no such capability. This one-sided advantage in one of the most important measures of strategic capability is at the core of the current United States-Soviet strategic force imbalance. The Soviet monopoly in this capability provides them a two-fold advantage over U.S. forces. First, it enables them to threaten the survivability of our entire land-based ICBM force in a first-strike attack while expending only a small proportion of their strategic ICBM force in the process. This large store of remaining ICBMs would enable them to divert weapons to other essential targets in a first-strike attack and still maintain a large and effective reserve force to conduct follow-on attacks and quickly deal with unforeseen contingencies. Second, the absence of an adequate United States prompt hard target capability affords Soviet war planners the luxury of knowing that for the crucial first few hours of a nuclear conflict, the bulk of their ICBM force and supporting command and control structure would remain largely immune to U.S. retaliation. This virtual immunity would eliminate one of the major sources of uncertainty that is so important to deterrence—the unpredictable effects of U.S. retaliation on Soviet war plans. Without this crucial uncertainty exerting an influence on Soviet war planning, their confidence in their ability to limit escalation and force an early termination of hostilities on terms favorable to Soviet interests is reinforced.

This development is too dangerous to be allowed to continue unchallenged. If we do nothing, we will face the very real danger that Soviets could at some

point come to believe that they could use, or threaten to use, nuclear forces in a limited manner to suppress military opposition and thereby gain military and political ends while limiting retaliation.

If we are to end this dangerous Soviet monopoly in prompt hard target capability, we must deploy the Peacekeeper missile. With its ability to respond rapidly and effectively to a Soviet attack the Peacekeeper will have the ability to degrade and quickly disrupt any Soviet attack. In addition to decreasing their confidence in being able to sustain a controlled and effective attack, the Peacekeeper's deployment in a closely spaced basing mode also will eliminate any confidence they would otherwise have in the likely success of an initial strike. These two factors, rapid hard target retaliatory capability and resistance to attack, make an indispensable contribution toward disabusing the Soviet Union of any notion that nuclear forces can ever be useful for purposes other than the deterrence of war.

But the elimination of the Soviet monopoly in hard target capability is not the Peacekeeper's only contribution to deterrence. Deployed in an attack-resistant CSB mode, the Peacekeeper also will restore the viability of our land-based ICBMs which have a number of attributes that make them crucial to our strategic deterrent. They are flexible, respond quickly, enjoy reliable, real-time communications with command authorities, offer alert rates approaching 100 percent and can be maintained at low operating cost. No other single strategic system possesses all of these important qualities.

By strengthening the effectiveness of our ICBM force, the Peacekeeper also will make a major contribution to the maintenance of a strong and viable strategic Triad. Over the last 20 years we have maintained a Triad of land-based ICBMs, manned bombers, and submarine-launched ballistic missiles as an effective means of preserving a stable deterrence over an extended period. The unique characteristics of the strategic components that make up the Triad bolster deterrence by acting in concert to complicate severely Soviet attack planning, making it more difficult on the one hand to plan and execute a successful attack on all these components and, on the other hand, making it more difficult to defend against their combined and complementary retaliatory effect. The Triad also acts as a hedge against a possible technological breakthrough that could threaten the viability of any single strategic system. The importance of the Triad to deterrence is very apparent today, when each leg is in need of modernization.

Thus, the unique capabilities of the Peacekeeper missile, deployed in CSB, strengthen deterrence in three ways: by ending the Soviet monopoly in hard target capability; by restoring the effectiveness and survivability of the ICBM force; and by bolstering the resilience of the strategic Triad.

Some have argued in opposition to the Peacekeeper that its short flight time and high accuracy make it a destabilizing first strike weapon. This assertion could not be further from the truth and reflects a myopic view of the strategic realities we face today. As I hope my testimony has already made clear to this committee, Peacekeeper derives its justification from its ability to mitigate the instabilities created by the Soviet Union's current first strike capability. Thus, the Peacekeeper is not a source of instability, but an effective response to it.

I would also like to point out that there is no such thing as a first strike weapon—only a first strike force. That is to say, no missile system, however effective, can confer a first strike capability by itself. To have a first strike capability such a system must be deployed in sufficient numbers to enable it to significantly reduce the effectiveness of an opponent's strategic force. At 100 Peacekeeper missiles, the President's deployment plan does not even approach such a capability. In fact, even if the previous Administration's plan, which called for the deployment of twice that number of Peacekeepers had been adhered to, the United States still would not have had the capability against the Soviet ICBM force that the Soviet Union enjoys against the U.S. ICBM force today. There is only one force in the world today which appears designed for first strike and that is the massive Soviet ICBM force which now already includes 308 powerful SS–18 heavy missiles and more than 300 SS–19 missiles. Both the SS–18 and SS–19 missiles are capable of attacking our Minuteman silos. For the record, the Peacekeeper is the same size as the SS–19 and has only about half the throw-weight of the SS–18.

Finally, there is the obvious consideration that if our purpose in developing and deploying Peacekeeper were to acquire a first strike capability; it would not have been necessary to expend so much time and effort to develop a sur-

vivable means of deploying it. The Peacekeeper clearly is not a first strike force, but an effective and stabilizing retaliatory force that is fully consistent with, indeed necessary to, the long standing purpose of American deterrence policy—the maintenance of peace.

But the impact of the deployment of the Peacekeeper missile in closely spaced basing extends beyond the world of nuclear deterrence. It also will have a significant impact on our foreign policy. The most immediate impact is likely to be on the essential NATO INF modernization program. Scheduled to begin in late 1983, this program is necessary to counter the growing Euro-strategic imbalance resulting from the persistent Soviet build-up of its SS–20 intermediate range missile force. Many of our NATO allies are watching the decision on the deployment of the Peacekeeper very closely. Deployment of a modern land-based missile system in this country will strengthen the U.S./NATO position favoring deployment of modern intermediate range nuclear forces in Europe. Failure to deploy Peacekeeper could undercut the ability of key allied governments to muster and hold the political support necessary to back Pershing II and ground-launched cruise missile deployments in their countries. This would be doubly dangerous because failure to deploy the Peacekeeper would be seen as undercutting America's nuclear umbrella for NATO.

But the Peacekeeper also has a wider, more long-term impact. The peacetime, day-to-day, decisions that collectively make up the behavior of the United States, the Soviet Union and all other nations are influenced by perceptions of the United States-Soviet strategic balance. The greater the imbalance, the more conscious we become of the limits to our options in international affairs and the greater the chance that we might be forced to compromise our interests to avoid crises that might overburden our capacity to deter conflict. In the same vein, the greater the imbalance, the greater the tendency of the Soviet Union to embrace ever more ambitious definitions of what constitute legitimate Soviet interests; the greater their tendency to view the risks of crises as an acceptable price to pay for the satisfaction of their political aims. The behavior of other nations is affected by perceptions of the strategic balance too. The greater the imbalance, the greater their tendency to view Soviet aims as interests to be accommodated; the greater, also, their tendency to view U.S. aims as interests to be ignored or challenged.

Today, we are confronted with just such a strategic imbalance; an imbalance that, in the face of the continued enhancement of Soviet power, will only worsen if we do nothing to counter it. There are many things we can do to reestablish a stable strategic balance, some of which we are doing already. However, because the imbalance is made far worse by the Soviet Union's ability to launch an effective first strike against the land-based missile of the United States, denying us their capabilities a stable balance cannot be restored without a deployment of the Peacekeeper/CSB system.

I have already described to you in some detail why the deployment of Peacekeeper/CSB is so important to a strong and viable deterrent. But our search for a durable foundation that can support a lasting peace must also incorporate significant and verifiable reductions in the size and destructive potential of existing nuclear arsenals. In this endeavor too, deployment of the Peacekeeper is essential. Last May, as the members of this committee are well aware, the President proposed to the Soviet Union that we agree on a strategic arms reduction treaty which would reduce by one third the overall size of both sides' deployed ballistic missile warheads, with even greater reductions in those weapons systems that are potentially the most destabilizing—land-based ballistic missiles. Whether the Presidents' START proposal is successful will, in large measure, depend on Soviet perceptions of this nation's determination to maintain its deterrent capability in the face of the persistent growth of Soviet military power. Because the Peacekeeper is essential to our deterrence capability, the Soviets will undoubtedly perceive this nation's decision on whether to deploy it a litmus test of the extent of that determination. If the American people and its Congress give their support to deployment of the Peacekeeper missile in CSB, the Soviet Union will quickly come to the realization that the United States understands the current strategic realities and fully intends to meet the national security obligations these realities impose. By reinforcing this perception of American determination, the Peacekeeper will discourage the notion that a continuation of the Soviet arms build-up will afford the Soviet Union any strategic advantage and encourage Soviet cooperation in bringing strategic arms under control. Conversely, fail-

ure to deploy the Peacekeeper will serve only to foster a Soviet belief in the soundness of their policy of seeking unilateral strategic advantage through the continued deployment of ever more powerful weapons in ever greater numbers.

Until this issue is clearly resolved in favor of Peacekeeper/CSB, we can expect little cooperation from the Soviet Union in Geneva. Therefore, in view of the importance of limiting strategic arms without any unnecessary delay, I urge the Congress to act swiftly in approving Peacekeeper/CSB.

There has been a considerable amount of speculation in the press recently that the Peacekeeper is intended to be a bargaining chip for the START negotiations. Let me assure you that this is not the case. It is the policy of this Administration that deployment decisions be based on strategic requirements, not on any notion of creating bargaining chips. Let there be no misunderstanding: the Peacekeeper is essential to national security, essential to nuclear deterrence, to our foreign policy, and to arms control negotiations. Thus, Peacekeeper/CSB should be seen as an incentive to serious negotiations by the Soviets, not as a bargaining chip to be given away in such negotiations. In fact, if our START negotiations are as successful in reducing nuclear arsenals as we expect them to be, Peacekeeper will be all the more necessary to the maintenance of a stable deterrence. As the number of strategic weapons is reduced, the relative importance of the survivability and effectiveness of the remaining weapons is increased. Thus, with its ability to provide an effective retaliatory capability and to bolster the deterrent effects of the Triad, Peacekeeper/CSB will be no less important to deterrence under a START environment than it is today.

Finally, I would like to spend a few moments to elaborate on the impact of Peacekeeper/CSB on existing arms control agreements. On May 31 of this year, the President declared that the United States would not undercut existing arms control agreements, provided the Soviets showed equal restraint. Some, including the Soviets, have argued that CSB violates specific provisions of the SALT I and II treaties prohibiting construction of additional fixed ICBM launchers. For some of those adhering to this view, especially the Soviets, this contention is nothing more than a convenient means of undermining support for the Peacekeeper. But for many others, it simply represents a misperception of the obligations imposed by existing agreements and the special characteristics of a Peacekeeper/CSB system.

The Peacekeeper in a closely spaced basing mode is a unique ICBM deployment design that is neither a traditional fixed launcher system nor a purely mobile system. Like a fixed system, it does incorporate protective silos from which the Peacekeeper is launched. However, unlike fixed systems, the actual Peacekeeper launcher is not the fixed silo, but the transportable canister which contains the missile and all necessary launch equipment.

But the Peacekeeper is more than just consistent with the letter of existing agreements; it is vital to achieve the real arms control and national security goals which prompted our negotiations. Our START proposal is intended to ensure strategic stability through the preservation of force survivability—a goal earlier agreements sought but were unable to achieve. In a CSB deployment, the Peacekeeper is admirably suited to this purpose.

Today, the security of this nation is at a crossroads. The decisions we make over the next few years could very likely have irreversible consequences for the future of deterrence, our status in the world and arms control. One of the most important decisions we will make is whether to support a closely spaced basing deployment of the Peacekeeper missile. For the sake of the future we all seek, I ardently hope that we do.

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## U.S. NUCLEAR DETERRENCE POLICY

### *I. Introduction*

I welcome this opportunity to brief the Committee on U.S. nuclear policy. Over the past several months few subjects have been treated so extensively—and so incorrectly—in the press. Our meeting today provides an opportunity to dispel the misconceptions about our nuclear strategy which these recent articles may have produced.

We live in a nuclear age. As of 1945, nuclear weapons became a fact of life. We can neither wish them away nor pretend that they do not exist. A review of the

ways in which the United States has dealt with these realities for the past 37 years contributes significantly to understanding U.S. nuclear policy today. With that goal in mind I will this morning:

Discuss our concept of deterrence;
Trace the evolution of U.S. strategic policy; and
Describe the systems we deploy to support the policy.

*II. Deterrence—The Concept*

In the wake of World War II, the United States and the Western democracies developed a policy intended to prevent any future recurrence of the tremendous carnage and devastation which the war had caused. The answer lay in addressing the root cause of the problem rather than the symptoms it produced. Thus the course of action chosen aimed at preventing wars from occurring in the first place. To that end, the United States made clear that it would use its atomic weapons not for conquest or coercion, but for discouraging—for deterring—aggression and attack against ourselves and our allies.

Today, deterrence remains—as it has for the past 37 years—the cornerstone of our strategic nuclear policy, and, indeed, of our entire national security posture. Our strategy is a defensive one, designed to prevent attack—particularly nuclear attack—against us or our allies. To deter successfully, we must be able—and must be seen to be able—to retaliate against any potential aggressor in such a manner that the costs we will exact will substantially exceed any gains he might hope to achieve through aggression. We, for our part, are under no illusions about the consequences of a nuclear war: we believe there would be no winners in such a war. But this recognition on our part is not sufficient to ensure effective deterrence or to prevent the outbreak of war: it is essential that the Soviet leadership understands this as well. We must make sure that the Soviet leadership, in calculating the risks of aggression, recognizes that because of our retaliatory capability, there can be no circumstance where the initiation of a nuclear war at any level or of any duration would make sense. If they recognize that our forces can deny them their objectives at whatever level of conflict they contemplate, and in addition that such a conflict could lead to the destructions of those political, military, and economic assets which they value most highly, then deterrence is enhanced and the risk of war diminished. It is this outcome which we seek to achieve.

*III. The Evolution of U.S. Strategic Policy*

During the late 1940's and early 1950's, America's virtual monopoly of intercontinental nuclear systems meant that our requirements for conventional deterrence were relatively small. The Soviet Union understood that, under our policy of "massive retaliation," we might respond to a Soviet attack, however limited, on the United States or our allies, with an atomic attack on the U.S.S.R. As the fifties ended and the sixties began, however, the Soviets began developing and acquiring long-range nuclear capabilities. As their capacity for nuclear and conventional aggression continued to grow, the U.S. threat to respond to a conventional or even limited nuclear attack with a massive nuclear retaliation became less and less credible. Accordingly, in the 1960's the United States—and later the NATO Allies—adopted a policy of "flexible response." Under this concept, the United States and NATO planned to strengthen general purpose warfare forces in order to better equip them to deal with a Soviet conventional attack; at the same time, U.S. nuclear capabilities were increased in order to provide the President with the option of using nuclear forces both to support our general purpose forces and to respond selectively (on less than an all-out basis) to a limited Soviet nuclear attack. The option of retaliation on a more massive scale was retained in order to deter the possibility of a major Soviet nuclear attack. This concept of flexible response remains as a central principle of our strategy today.

Of paramount importance to the flexible response strategy is the requirement for flexibility—for our nuclear forces and plans for their use to be designed and developed in such a way that our response is appropriate to the circumstances of the aggression against us. This means that they should be capable of being used on a very limited basis as well as more massively. This does not imply that through flexible response we seek to fight a limited nuclear war, or, for that

matter, to fight a nuclear war under any conditions. Our basic strategy, in direct support of our policy of deterrence has been, and remains, the prevention of any aggression, nuclear or conventional. But it would be irresponsible—indeed immoral—to reject the possibility that the terrible consequences of a nuclear conflict might be limited if deterrence should fail. To be sure, there is no such guarantee that we would be successful in creating such limits. But there is every guarantee that restrictions cannot be achieved if we do not attempt to do so.

While we work toward insuring deterrence, we need to think about the failures of deterrence (for whatever reason). If that were to occur we cannot predict the nature of a Soviet nuclear strike, nor assure with any certainty that what may have started out as a limited Soviet attack would remain confined at that level. Nevertheless, we must plan for flexibility in our forces and in our response options so that there is a possibility of re-establishing deterrence at the lowest possible level of violence, and avoiding further escalation. I assure you it is not pleasant to think in these terms, but it would certainly be the gravest irresponsibility for those of us who are charged with the nation's defense not to do so.

Of course, this concept of seeking to contain the level of destruction by having flexible and enduring forces is not new. It has been squarely in the mainstream of American strategic thinking for over two decades. A brief review of the record illustrates this point well. In the early 1960's, then Secretary of Defense Robert McNamara told the Congress:

"The major mission of the Strategic Retaliatory Forces is to deter war by their capability to destroy the enemy's war-making potential, including not only his nuclear strike forces and military installations, but also his urban society, if necessary. . . . What we are proposing is a capability to strike back after absorbing the first blow. This means we have to build and maintain a second strike force. Such a force should have sufficient flexibility to permit a choice of strategies, particularly an ability to: (1) strike back decisively at the entire Soviet target system simultaneously or (2) strike back first at the Soviet bomber bases, missile sites, and other military installations associated with their long-range nuclear forces to reduce the power of any follow-on attack—and then if necessary, strike back at the Soviet urban and industrial complex in a controlled and deliberate way." [1]

Almost a decade later, then Secretary of Defense James Schlesinger reaffirmed the importance of strategic force flexibility when he told the Congress that, to remain credible, a deterrent strategy must be consistent with the threat it seeks to deter.

"If anything, the need for options other than suicide or surrender, and other than escalation to all out nuclear war, is more important for us today than it was in 1960, because of the growth of the capabilities possessed by other powers . . . The Soviet Union now has the capability in its missile forces to undertake selective attacks against targets other than cities. This poses for us an obligation, if we are to ensure the credibility of our strategic deterrent, to be certain that we have a comparable capability in our strategic systems and in our targeting doctrine, and to be certain that the U.S.S.R. has no misunderstanding on this point. . ." [2]

As the 1980's began, Harold Brown, in explaining the policy of deterrence to the Congress, emphasized the importance of flexibility in much the same way as did his predecessors:

"To the Soviet Union, our strategy makes clear that no course of aggression by them that led to the use of nuclear weapons, on any scale of attack and at any stage of conflict, could lead to victory, however they define victory. Besides our power to devastate the full target system of the U.S.S.R., the United States would have the option for more selective, lesser retaliatory attacks that would exact a prohibitively high price from the things that Soviet leadership prizes most—political and military control, nuclear and conventional military force, and the economic base needed to sustain a war. . . . Our planning must provide a continuum of options, ranging from small numbers of strategic and/or theater

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[1] Statement of Secretary of Defense Robert S. McNamara before the House Armed Services Committee, The Fiscal Year 1964–68 Defense Program and 1964 Defense Budget. January 30, 1963. pp. 28–30.

[2] Department of Defense Annual Report, Fiscal Year 1975, March 4, 1974, p. 4.

nuclear weapons aimed at narrowly defined targets, to employment of large portions of our nuclear forces against a broad spectrum of targets." [3]

Thus, the past three and a half decades have taught us two central lessons with regard to implementing our policy . . . lessons which we must continue to take into account in the years ahead:

First, in order for our retaliatory threat to be seen as credible, we must be able—and be seen to have the means—to respond appropriately to a wide range of aggressive actions; if our threatened response is perceived as inadequate or inappropriate, it will be seen as a bluff and ignored;

Second, deterrence is a dynamic effort, not a static one. In order to continue to deter successfully, our capabilities must change as the threat changes, and as our knowledge of what is necessary to deter improves.

### *IV. The Forces for Nuclear Deterrence*

A policy of deterrence through flexible response would be hollow and not credible—to us, and to our allies and adversaries alike—if we did not possess the military forces and capabilities necessary to enforce it. As a result, we have maintained—and will continue to maintain—strategic nuclear weapons systems which we have procured and deployed for the express purpose of avoiding their use in anger. This seeming paradox lies at the heart of our strategic deterrent posture.

In the 1960's the United States' nuclear forces evolved from one composed primarily of manned bombers to the current balanced force structure of manned bombers, intercontinental land-based ballistic missiles, and ballistic missiles fired from our fleet submarine forces. This force configuration, commonly known as the "Triad," has been retained because it complicates an enemy's ability to attack our strategic nuclear forces, provides us with maximum flexibility, and hedges against a catastrophic failure (either through technical difficulties or hostile action) of one leg of the Triad. The Triad has served us well in the past and will continue to do so in the future.

By the early 1960's, the United States had over 7,000 strategic nuclear weapons, most of which were carried by B-47s, and the then-new B-52s. The Soviet Union had fewer than 500 strategic warheads. Throughout the 1960's our strategic posture presented the Soviet planner with a dilemma if he decided to pre-empt against the United States: due to the relatively small number of weapons the U.S.S.R. possessed and their ineffectiveness against any U.S. strategic force, such an attack was impossible to execute successfully. If the Soviet planner targeted our hardened missile silos and alert bomber bases, he found that he would deplete his arsenal while not significantly reducing U.S. retaliatory forces. In other words, his ability to limit the certain massive destruction to his own forces and society was rather small. If on the other hand, the Soviet planner targeted U.S. cities he would feel the full brunt of a U.S. retaliatory strike against his own cities, a U.S. arsenal quite larger and much more capable than his own, by any measure. Again, he was deterred.

During the course of the 1970's the Soviet arsenal began growing both in quantity and in quality (although the U.S. qualitative edge remained). The Soviets expanded their land-based missile force and hardened their protective silos. At the same time, the United States made a conscious choice not to upgrade the yield/accuracy combination of its own missile forces or to build force levels of sufficient size to threaten the Soviet Union with a sudden disarming first strike. The net result of this was to allow the Soviets a "sanctuary" for its ICBM force, since U.S. forces could not attack it effectively. The Soviets, however, did not follow our lead and developed a new generation of ICBMs specifically designed to attack U.S. missile silos. By the late 1970's, this combination of vulnerable U.S. missiles and a Soviet sanctuary has eased the earlier dilemma of the Soviet planner. Now, he potentially could envision nuclear confrontation in which he probed U.S. resolve to retaliate by attacking a smaller and smaller subset of the U.S. military forces—while U.S. options for retaliation were limited. If the Soviet leadership came to accept this as plausible, our deterrent policy, and, as a result, global stability, would be severely threatened. As the "imbalance of imbalances" continued to grow in the late 1970's, that is, as the Soviets began tipping the theater nuclear balance in their favor while maintaining their superiority in conventional forces, the risk

[3] Department of Defense Annual Report, Fiscal Year 1982, January 1981, pp. 40–41.

became greater that this type of limited attack would appear attractive to the Soviet military.

The strategic modernization program which President Reagan set forth in October 1981 is designed to address in part this adverse and imbalanced situation. It restores the margin of safety we require in order to continue to deter successfully Soviet strategic aggression. In essence, the program is designed to accomplish two general goals: first, to improve the survivability of our present and planned forces in order that they do not serve to destabilize potential crises by offering lucrative targets for Soviet preemption; and, secondly, to sustain the credibility of our deterrent policy by developing the capability to threaten, and destroy if necessary, the full spectrum of potential Soviet targets. This combination of improved survivability and military capability is intended to assure that Soviet leadership will continue to recognize clearly and unambiguously that they can realize no conceivable benefit from initiating nuclear aggression.

Let me review briefly our modernization program to highlight how the specific elements contribute to these goals. With regard to survivability, we are taking the following steps:

In the area of command, control and communications we are upgrading the survivability of command centers and communications links upon which the effective use of our forces depends; we are also improving the survivability, performance and coverage of our warning and attack assessment systems in order that we may provide the President—and our forces—with the maximum amount of control and timely information to respond to nuclear attack.

With regard to our bomber forces, we have begun production of a variant of the B–1 bomber which—because of its superior base escape ability—is far less vulnerable to destruction on the ground than the B–52; by equipping the B–52 with cruise missiles we are extending the in-flight survivability of these aircraft, which because of their age are increasingly less able to survive penetration missions in the face of the large and sophisticated Soviet air defense net.

We have taken advantage of the high survivability currently enjoyed by our sea-based systems by developing and deploying two new systems, the sea-launched cruise missile and the Trident II; deployment of the cruise missiles on selected attack submarines, as part of our secure reserve force, will ensure continued long-term survivability and the extended range potential of the Trident II will provide a hedge against any unanticipated advances in Soviet anti-submarine warfare.

Perhaps the most vulnerable of our retaliatory forces are the Minuteman and Titan ICBMs which were designed and housed in the late 1950's and 1960's. Designed to deter a Soviet threat of the past, these missiles have served us well. The Peacekeeper is designed to meet both the current and future Soviet threat, both in capability and survivability. Peacekeeper in Closely Spaced Basing will, at long last, provide a feasible, affordable solution to the ICBM vulnerability problem.

Finally, by upgrading our air defense and warning capability, we will remove any Soviet misperceptions they might have about being able to use small scale raids by bomber or cruise missile forces to disable our warning and control systems.

With regard to developing the military capabilities necessary to make our retaliatory deterrent posture stronger and more credible, we are pursuing the following measures:

By deploying the B–1 variant as soon as possible and by equipping less obsolescent model B–52s with air-launched cruise missiles, we will be able to continue to pose both a penetrating bomber and a stand-off cruise missile threat to the U.S.S.R. This combination places the greatest amount of stress on Soviet air defenses and thereby ensures that a high number of our bomber-delivered weapons will reach their targets; once the advanced technology, or "Stealth" bomber enters the inventory, it can assume a major share of the penetration mission, and, in combination with B–1s in a mixed air-launched cruise missile carrier and penetration role, will continue to give us high confidence that our retaliatory strike can be successful.

The Trident II missile, with its substantial increase in accuracy over previous SLBMs, will provide a hard target kill capability which will contribute significantly to our ability to hold the full Soviet target base at risk. A sea-based capability of this kind increases the flexibility of our strategic posture; provides an important hedge to the loss, through unexpected system failure, of similar land-based missiles; reduces Soviet incentives to attempt a pre-emptive strike

against our ICBM force; and complicates severely Soviet offensive and defensive planning.

The Peacekeeper has had a highly successful research and development program and will be ready for deployment in 1986; we must be able to draw on its prompt hard target kill capability as soon as possible so that the Soviet Union would have to assume that even as it attempted to evaluate the consequences of its first strike it would be losing military capability it would need to implement its strategy. This will offset the current Soviet monopoly in this area.

In sum, the strategic modernization program is tailored precisely to provide the capabilities we need in order to ensure that our deterrent continues to be credible and effective well into the next century, as well as to support our arms control efforts to reduce significantly the nuclear arsenals of both sides.

Let me conclude by returning to the point at which I began. There is nothing new about our policy. Since the era of nuclear weapons began, the United States has sought to prevent a nuclear war through a policy of deterrence. That policy has worked successfully for almost four decades. We are dedicated to ensuring that it continues to do so.

The CHAIRMAN. We very much appreciate that, and because you have in your statement indicated that Dense Pack is compatible with SALT and we can deploy an ABM in Cheyenne, Wyo., could the Department prepare a brief on those points for us that we could study?

Secretary WEINBERGER. Surely. We would be glad to give you the information upon which we acted.

The CHAIRMAN. We appreciate that. If we observe the lights closely, we will divide the time between now and noon among the Senators present. If we stick to those lights, I think we can get in every Senator.

Secretary WEINBERGER. My subsequent answers will be a lot shorter, Mr. Chairman.

The CHAIRMAN. I am talking to the Senators on that, including myself.

I did mention the meeting with Marshal Ustinov, and I would like to just go back to one other aspect of that conversation that I had in the Kremlin. That concerned credibility, the question they raised as to whether we will ever again ratify a treaty on arms control.

At the end of this administration's first term in office it will be a decade since we have ratified an arms control treaty. The last was the Protocol to the ABM Treaty in 1974.

We have before this committee two treaties: The Threshold Test Ban [TTB] and the Peaceful Nuclear Explosion [PNE] Treaties. I was assured in July by ACDA Director Rostow that the administration would have its position on verification enhancement ready for committee consultation by October 1. That date has come and gone. The administration then claimed it would conclude its review by December 10 in time for a December 16 consultation with us.

I postponed that consultation after learning the administration has yet to finish its review. Both Presidents Nixon and Ford have strongly urged that we ratify those two treaties.

[Letter from President Ford follows:]

AUGUST 26, 1981.

Hon. CHARLES H. PERCY,
*Chairman, Committee on Foreign Relations,*
*U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: Your letter of August 6th, in reference to the Threshold Test Ban and Peaceful Nuclear Explosion treaties, has been received.

I share your views that both treaties should be ratified by the U.S. Senate as soon as possible and, as a result, will strongly express my viewpoint to President Reagan and others in his Administration.

Warmest best wishes,

GERALD R. FORD.

I think from the standpoint of gaining credibility that the Senate will ratify a treaty supported by the administration. It would be worth it from that standpoint alone.

Can you, Mr. Secretary, explain why the administration is unable to complete the task of moving forward on these accords?

Secretary WEINBERGER. Well, Mr. Chairman, I do not think the administration has been able to move forward, because I think it feels that in light of all of the developments just since we took office, the verifiability of these treaties has not been sufficiently secured. But this is not my special field. That is my impression of what has led to the time delay.

The CHAIRMAN. I put the question to you specifically because we have heard that the Defense Department actually is delaying it because there is a wish among some members of the Defense Department to retain the option to conduct high yield weapons tests that are prohibited by these treaties.

Secretary WEINBERGER. No, it is not the things that are prohibited by the treaties that concerns us. It is the verifiability of Soviet compliance with the treaties that is a matter of great concern.

The CHAIRMAN. So there is no pressure in the Defense Department then for higher yield weapons tests?

Secretary WEINBERGER. It is a very long, complex subject, Mr. Chairman, but essentially the problem is that the Soviets, we believe, either have or are able to violate this treaty by testing these higher yield weapons themselves. And when I say that there is not adequate verification, I am trying to convey, first of all, that there isn't adequate verification from our point of view and it has led and can lead in the future to violations by the Soviets that involve testing these higher yield weapons which, if we are to pursue our path of deterrence, would argue that we should perhaps be looking into that same kind of area.

The CHAIRMAN. Could you do what you can—and you can do a great deal—to move these two treaties forward so we can get some decision on them? They are precedent-setting agreements. I happen to think they could be valuable in themselves and an indication that we are willing to move forward with treaties and can ratify and get a two-thirds vote if the administration will support them.

Secretary WEINBERGER. I would certainly be glad to do what I could to get a response to your specific question. I certainly cannot promise that the administration would want to support them.

The CHAIRMAN. I have been asked by a noted expert in the field to put the question to the administration as to why it did take so long to get to the negotiating table with the Soviets. It did take us more than a year to do that. It seems to this expert that your leverage would have been much greater in 1981 when support for MX and for defense spending in general was strong and there was no significant freeze movement.

What assurance can we have that the leverage provided by the MX will be used to achieve an agreement rather than using the negotiations as an excuse to build a missile of dubious utility?

Secretary WEINBERGER. I would certainly challenge the latter characterization of the missile. I think it is not of dubious utility. I think it is essential to regain an effective deterrent.

I would not characterize what occurred as any great delay in getting to the table, Mr. Chairman. We came into office in January 1981. We submitted our defense proposals in March. We secured enactment of almost all those proposals in the fall. In November, if I remember correctly, the President made a very bold and dramatic proposal for a reduction of arms at the intermediate range, one that, quite frankly, captured the imagination of the world by suggesting and urging that we reduce those weapons to zero on both sides. The Soviets would eliminate their SS–4's, SS–5's, and SS–20's, and we would agree not to deploy the weapons the Soviets feared most, the Pershing II and the ground launch cruise missile.

That was proposed in November, in the final stages of the enactment of the President's first year proposed defense buildup. We felt, and I certainly feel, that there is no way the Soviets would really believe that America is firmly embarked on a different course of trying to strengthen our armaments and regain a full deterrent capability, until we have some congressional action that has taken place, and until the program was under way, we also felt that the President needed time to develop his START proposal and examine it thoroughly to see if it is consistent with all of our basic security objectives.

I do not think that the submission of that very bold, very dramatic, very hopeful proposal for the world was in any way delayed. I think it came in at a proper time. I very much hope it will be agreed to. It is being negotiated and discussed and has been for over a year now.

The START proposal then was made after an examination as to determine the greatest level of reductions that the proposal could safely make. That is exactly what the President did.

The CHAIRMAN. Thank you, Mr. Secretary.

Senator Pell.

Senator PELL. Thank you, Mr. Chairman.

I am sure the chairman will agree with me that while we have a 5-minute time limit for questions that those of us who have more questions, even if we have to miss our party caucus meetings, have the right to stay on and wait our turn and ask more questions.

Mr. Secretary, just to set the record straight on this article of Mr. Scheer, what was the document referred to in the Los Angeles Times that was not recognizable to you?

Secretary WEINBERGER. I do not know what he is referring to, Senator, because there is nothing in the Defense Department that talks about a 6-month war or any estimate of acceptable casualties or anything of the kind. It is absolutely whole cloth as far as I am concerned.

Senator PELL. In other words, there is no such document? These are the two sentences pertinent to the question:

> On the orders of the Reagan administration, the Pentagon completed a strategic master plan last week to give the United States the ability to win and perfect a nuclear war with the Soviet Union. The document was delivered to the National Security Council and is awaiting President Reagan's approval.

You say there is no such document?

Secretary WEINBERGER. I do not know what you are now talking about, documents directing strategy and the like. I understood your question to refer to some document which specifically said that a 6-month war was something we should plan for and there was an ac-

ceptable limit of casualties. There is not anything of that kind that I know of.

We have done a lot of planning, and we have had a lot of documents back and forth between the National Security Council and ourselves. We have a document which is supposed to guide force acquisitions and resource allocations and correlate what we need with what we have requested.

There are all kinds of documents, but none of these documents have any of the nonsense about an acceptable level of casualties or a 6-month war or anything of that kind.

Senator PELL. Well, do none of these documents mention 20 million American deaths as being possible?

Secretary WEINBERGER. None that I am familiar with and none that I have seen, and if I should see such a document, I would immediately throw it out because it is not a document which would ever state the policy or the planning of the Department of Defense.

Senator PELL. And there is no such document floating around in the Pentagon referring to a nuclear war that lasts 6 months?

Secretary WEINBERGER. None that I have seen.

Senator PELL. None dealing with a tactical nuclear war? And no such plan that says, "American nuclear forces must prevail and be able to force the Soviet Union to seek a determination in terms favorable to the United States?"

Secretary WEINBERGER. You and I have talked about the term prevailing many times before and again this morning, and I have explained to you, or tried to, that our policy, our plan, our goal, everything we do, is based upon deterring a war; preventing its occurrence through deterrence.

But it would not be proper for us to ignore the fact that deterrence could fail because of a misperception as to America's retaliatory capability or because we were not allowed the funding to secure that retaliatory capability. In any event you would not want anyone sitting in my position to work out a set of plans which involve the capitulation or the subjugation of the United States.

Senator PELL. But in the event of nuclear war can you imagine either side prevailing or being better off than the other?

Secretary WEINBERGER. All I can imagine, Senator, is that every effort would have to be made first to deter it, and second, to try to insure that if there were a first strike by the Soviets, the situation would be sealed off as quickly as possible and the level of violence limited and reduced and terminated at the lowest possible level of conflict. That is all that we can try to do.

But that itself would be a failure of the policy of deterrence, and that is why it is so essential that we acquire the means to have effective deterrence. It is a policy which has worked. It is a policy which requires change and modernization as the Soviets change their capabilities. And that is why we have to do so much now so quickly.

Senator PELL. Would you concur that there would be no winners in a nuclear war?

Secretary WEINBERGER. I do not see how there could be any winners in a nuclear war, sir. That is why I think it is essential that we try to deter it and—if they should start it—that we do everything we can to

try to terminate that conflict as quickly as possible in a way that would provide for the survival of the United States.

Senator PELL. Now, excuse my denseness in this and I am not talking about Dense Pack—but if there was a nuclear war, could you define for me in maybe a sentence what you mean by "prevailing?"

Secretary WEINBERGER. I have just defined it—namely, that the violence would be terminated at the lowest possible level; that the conflict would be terminated at the lowest possible level of violence and that the United States would survive.

If anyone wants me to do any other kind of planning, sir, I would have to say that I am not the person to do it.

Senator PELL. Thank you. My time has expired.

The CHAIRMAN. Senator Pressler.

Thank you, Senator Pell.

Senator PRESSLER. Secretary Weinberger, I shall oppose the plan put forth on the MX reluctantly. I have given a great deal of thought to the President's proposal. It has been my strongest feeling that we have not had an adequate explanation of why we cannot modernize the Minuteman missile. The Minuteman is a proven system. The Air Force has told me that for $7.5 billion we could bring its accuracy up to MX levels.

Why not consider superhardening the Minuteman silos using the newly developed steel encasing techniques as proposed for Dense Pack? What about hardening the Minuteman's launch communications network? I understand this is an improvement that has been recommended in the past. We have over 150 Minuteman missiles in my area alone, spread around, which would be almost impossible to destroy all of them in a first strike.

Certainly it seems with the uncertainties surrounding the MX that at a much cheaper price—and I am told that the MX by the time it is built will cost $30 billion or $40 billion, although there is debate about that—but for a much lower cost we can modernize the Minuteman missiles. The Minuteman missiles are spread out so much that a first strike almost could not destroy them. And I am told that the accuracy of the Minuteman could be equally great as the MX with improved accuracy technology that can be mounted on them.

So what I am saying is are we passing up a very cost saving option here and going into an extremely expensive program without gaining any strategic capabilities? Could we modernize the Minuteman?

Secretary WEINBERGER. Sir, there are a number of answers to that, and I would like to give some. Then if my colleagues would want to supplement that, I would invite them to do so.

The first point I think we have to get across however, is that the Minuteman system as it is now deployed is a system to which the Soviets have built a counter. They have deployed a system of very high yield, accurate, missiles, with a high degree of fractionization that enables them to do just what you said, to destroy about 90 to 95 percent of the Minuteman system effectively on a first strike.

Now it is true that the Minuteman silos are not hardened sufficiently to survive the current Soviet threat, and it is possible that some additional hardening could be done in that area. Again, you then have to bear in mind that the hardening that we are talking about for the

closely spaced basing system is a hardening that enables it to withstand an entire missile once that missile detonates, then fratricide makes it impossible for the Soviets—as they are presently configured—to attack effectively.

But if we deploy the MX or any missile in Minuteman silos, they are now capable of destroying that system without using up more than a fraction of their missile capability. They would still have a substantial number left, so then we would be forced to rely entirely on the B–52's and on submarines.

As you know, we are trying to replace the B–52's, with the B–1's, and we have succeeded so far in securing the necessary funds from the Congress. I hope we will continue to be successful in securing the funds for the aircraft. The B–1B will give us the ability to penetrate, and we will regain that second leg of the Triad for a number of years to come.

The current submarine weapons now do not have either the yield or the accuracy to destroy Soviet hardened targets, and the Soviets have hardened more than half of their most valuable targets. Therefore, it is essential for us to get the D–5 missile, which will not be ready until 1989. The D–5 will have the necessary accuracy and the yield. But we cannot fulfill our duty to defend the United States, if we allow our vulnerabilities to remain for an extended period of time without doing everything we can to insure that we regain a deterrent capability as quickly as possible.

Now this is not to say we cannot do great damage or that we do not have great strengths. We do. But we want to do, and what our basic deterrence policy calls for is not to attack Soviet cities with basically inaccurate missiles but to attack their hardened targets. In order to do that effectively and maintain deterrence, we need the kind of capability that the MX and only the MX has, and we need to deploy it in a field which is essentially survivable. That is what we do not now have.

Senator PRESSLER. As for the assumption that the vulnerability of the Minuteman missiles. I do not share that assumption, because the Minutemen are spread so widely. Also, it has been said, as soon as we build the MX, we are probably going to have to build an ABM system of some sort to protect them. Certainly the same reasoning could be held for the Minuteman.

Secretary WEINBERGER. Senator, I do not want to interrupt you, but the ABM system is not effective to protect widely dispersed fields. The other problem is that while you are perfectly entitled to disagree with our estimate as to the vulnerability of the Minuteman, the simple fact of the matter is that it is that Soviet fractionation and accuracy that makes it so vulnerable, widely dispersed as it is.

Senator PRESSLER. You mean the lack of accuracy of the Minuteman?

Secretary WEINBERGER. No; it is the accuracy of the Soviets. Dr. DeLauer, do you want to comment?

Dr. DELAUER. Senator, the issue of hardness alone is not sufficient to make the system survivable. With the accuracy projected, the Soviets have now, and will have even better in the future, a small yield weapon with a surface burst that will indeed destroy a single silo.

Senator PRESSLER. But that would be true of the MX also.

Dr. DELAUER. Not when you take the question of hardness and space the silos in such a way that you cannot at the same time individually

target each silo because of the question of fratricide, this spreads the time of attack out in such a way that there are windows in the battle management that permit us to utilize the missile before it can be destroyed.

The Minuteman fields, spread the way they are, can each be attacked separately, and the Soviets will not have any problem at all with the accuracy that their missiles now have. So it is a combination of the superhardness forcing surface bursts and close spacing which forces them to face the question of the survivability of subsequent waves of attacking missiles. In other words, the uncertainty of their attack goes very high, whereas against Minuteman fields, their uncertainty is very low.

Senator PRESSLER. Let me just conclude by saying that the very arguments you make that the Russians can pinpoint so carefully the Minuteman, they can also pinpoint the MX. Newsweek magazine published an article saying that the fratricide effect could be negated if the Soviet detonated their warheads tenths of a second apart one from another. Fratricide would not occur, and it seems to me that the very arguments you are giving would be against the MX. My time is up, and I see the chairman frowning at me. But that is my view at this point.

The CHAIRMAN. Thank you very much.

Senator Biden, the Secretary has been called to the phone by the President, so would you care to put your questions to other distinguished witnesses? He will be back in just a moment.

Senator BIDEN. I would be delighted in the interest of time to keep right on going.

For the record, I share the conclusion held by Senator Pressler, for very different reasons. I think your arguments, Doctor, are the only arguments you have, and they are not able to be discounted very easily, I acknowledge. I am opposed to MX for reasons which my second and third round of questions I hope I will be able to get to, but let me get to the heart of it, if I can, as I see it.

The Secretary this morning has emphasized and re-emphasized that what we are really talking about here is deterrence, deterring a first strike by the Soviet Union, and preserving our land-based system. Now, for the sake of argument, assuming you were able to find a way to so superharden or to reconfigure the Minuteman system to make it survivable, would there be a need for the MX missile? That is, if you closed the window of vulnerability, the vulnerability of the Minuteman system, would there be a need for MX in a closed window situation?

Dr. DELAUER. Senator, I think you have to go back to just how you opened your remarks, that what we are after here is a deterrent. Now a deterrent, to be credible has to have at least two elements. One, it has to be survivable. Two, it has to have proven military value in the survivable mode.

Senator BIDEN. And you are suggesting that the Minuteman does not have proven military——

Dr. DELAUER. No; I am not suggesting that. I am suggesting it is not survivable.

Senator BIDEN. Now, I am saying, assuming you were able to find a way to solve the survivability problem, which I will get to in the second or third round of questioning, but take for the moment operating on the assumption that you have found a way to make Minuteman survivable, would then you need an MX system?

Dr. DELAUER. If you found a way to make Minuteman survivable, then the land-based leg of the deterrent would indeed be a deterrent.

Senator BIDEN. OK. That sounds awfully simplistic to approach it that way, but we keep arguing, not you, but in this national debate, two different elements of the MX. One, its original purpose as was presented to us years ago, and in this committee and the Intelligence Committee, was that we needed a survivable land-based system, not that in a survivable mode the Minuteman was not a useful deterrent. And so I want to separate the two out, the question of survivability and then the usefulness of surviving Minuteman missiles.

Dr. DELAUER. Senator, may I add one caveat to that? The Minuteman as presently configured with its accuracy is not sufficient to be able to threaten militarily some very hard, high value targets that the Soviet Union now has in place, so that with that caveat——

Senator BIDEN. But to oversimplify it, with the MX guidance systems on it, it would be able to do that, I suspect. Now, a second question is, assuming you had the D–5 today, would you be asking us for the MX?

Dr. DELAUER. If we had the D–5 today?

Senator BIDEN. I mean, if we were able to deploy the D–5 within the timeframe that we can deploy the MX, would you be asking for—would the MX be as critical an element on your list?

Dr. DELAUER. In my view, Senator, yes, because I firmly support and believe in it, and I firmly worked for over 25 years on the concept that our strategic deterrent is based on the Triad.

Senator BIDEN. Well, I will get back to that again also. I disagree with you on that. But let me go to the third point. And I realize my time is drastically moving along here. We used to do, up until 1980, we, and I use that term loosely, the Defense Department and the Strategic Air Command in particular used to do a thing called a dynamic balance. Now, I have been trying to get a hold of the dynamic balance, and I understand you stopped doing it in 1980, and for the purposes of my colleagues, possibly.

For those who will read the record, the dynamic balance that—I saw it in 1979 and 1980, or 1978 and 1979, I can't remember which—it was in a different committee, the Intelligence Committee—really was a measure of Soviet capability, strategic capability versus U.S. strategic capability, and it was put on a grid, and the President, the then President said, taking 1977 as the time when we believe there was parity, and let's not argue about whether there was or was not, I do not want that strategic or that dynamic balance to change any, that we do not want that to change. We do not want to be any worse off.

It did two things. On the one side of a ledger, it registered how much damage could be inflicted by the Soviets, what that would do to us and what we would be left with in the retaliatory mode, but it also did a second thing. It measured what the Soviet circumstances would be were we to strike first. We did not have a strike first option. It was not

changed in the doctrine, but it did measure, because they precluded, rightfully so, that a Soviet planner would have to be equally as vigilant as you, Mr. Secretary, and you are protecting the United States, a Soviet planner would have to be equally as vigilant and have to consider all contingencies, even a first strike by the United States.

And so, when they did that, it showed various damage we could inflict upon the Soviet Union. Now, my question is, if a dynamic balance chart were worked up today, with the D–5 on it, with the MX on that chart, is it not clear that the Soviets would be considerably more vulnerable to a first strike by the United States than the United States is now to a Soviet first strike?

Secretary WEINBERGER. Senator, I am not going to get into any kind of hypothetical speculation about the United States making a first strike or what would happen if we did because it is totally opposed to our doctrine. It is totally opposed to our policy. Our policy is to deter a first strike by the Soviets, and, if you will forgive me, I am just not going to get into any kind of hypothetical speculation. There have been so many misinterpretations and misperceptions of the matters I have discussed earlier with Senator Pell that I can well imagine what there would be if we started speculating on what would happen if the United States were to make a first strike. We do not have any plan or any policy to make a first strike.

Senator BIDEN. I understand that you do not, nor will we. I understand that. We are talking about getting to reducing arms significantly, and arms control. The Soviet Union has to assume the worst, since in fact we were the only nation to ever drop a nuclear weapon, since in fact we have been the only ones who ever demonstrated the willingness to do that. I believe we never will, but it is prudent for them to plan it, and I am going to say something that I will put out as my view, and unless it can be refuted, I would like everyone to know it, and if you can refute it fine, either here or publicly.

With the MX missile, and with the D–5, we will be in a position if we were to choose, which we are not going to choose, to inflict serious damage, overwhelming damage upon the Soviet Union if we struck first, a first strike capability that far exceeds what the Soviets' first strike capability is now.

Now, if that is not correct, you can in fact tell me how that is not correct in private or public, and I will then publicly come out and say that is not true, but until that is told, everything that I have been told leads to that conclusion, and the reason I mention it, if that is true, not that that is our goal, but if that is true, I do not know how we can reach an arms control agreement with the Soviet Union if neither of those items are negotiable.

Secretary WEINBERGER. Senator, the proposal that is before the negotiators is the arms control agreement that we want to secure. We want to be sure that it is completely verifiable, and then we want to secure it. As you know, it provides for substantially lower levels than now exist on both sides. In the case of intermediate range weapons it provides for none at all. It provides for a major reduction in missiles, and in ground-based missiles particularly.

Senator BIDEN. With MX and with D–5, though.

Secretary WEINBERGER. I am sorry?

Senator BIDEN. But with MX and with D–5 at those significantly reduced numbers.

Secretary WEINBERGER. The important point, however, is that those proposals are being negotiated seriously by the Soviets and not laughed off as far less drastic proposals were a few years earlier because they know that we have the plan to regain a strategic deterrent capability. It is essential that that deterrent capability be recovered because we invite attack without it. Deterrence is secured when you have a survivable method of retaliation. We have not only no plans for a first strike, we eschew completely a first strike policy. We have always said that, and that is still the case. But it is essential that we be able to respond after a first strike by them, and it is essential that that response be correctly perceived by them as being able to inflict a degree of damage that they would find unacceptable, and thus deter them from launching a first strike.

Senator BIDEN. To put it another way, we will have a strategic advantage after these two items?

Secretary WEINBERGER. No, sir. We will have an ability to maintain deterrence, which I am worried that we are losing now, and I think that as we lose it and as we do nothing to regain it, we increase the danger to ourselves and the world in a very substantial way.

Senator BIDEN. Thank you.

The CHAIRMAN. Thank you, Senator Biden.

Senator Glenn?

Senator GLENN. Thank you, Mr. Chairman.

Mr. Secretary, if the Soviets set up a Dense Pack situation of their own, do we not have the technical capability to attack it successfully?

Secretary WEINBERGER. We do not now. We would have to develop that. We would have to work on counters to try to do it, and what they have now we do not have the ability to destroy or to retaliate against.

Senator GLENN. You do not feel that our ground penetration nuclear weapons systems would work effectively?

Secretary WEINBERGER. We do not have that kind of penetrator, and the counter to that kind of penetrator is comparatively easy to install.

Senator GLENN. We already tested one ground penetrator. Would it not get through a Dense Pack?

Dr. DELAUER. Senator, the only penetrator we tested was done accidentally, and that is the Mark–43.

Senator GLENN. It worked.

Dr. DELAUER. It was an airplane delivered system. It was not a ballistic missile warhead.

Senator GLENN. But it was a ground penetration system, and it went in and exploded and made its hole, and it would have gone through a fratricide type environment, as I understand it from some of your own experts in the Pentagon.

Secretary WEINBERGER. It is not a fratricide argument we are talking about with Earth penetrators. It is an ability to get into the Earth and to do damage and there is a counter to it, and thus is what we would consider very seriously for the Dense Pack system should they show signs of developing an Earth penetrator. And we would know if they were doing so. The counter for it is comparatively simple. It is

called a rockpile. It is a heavy covering of rock over the whole field.

Senator GLENN. Well, how about the Pershing system? Would that not have gotten through? We are talking about penetrating actually hard Earth as opposed to just flying through airborne debris. Would that not have gone through?

Dr. DELAUER. Senator, you are mixing weapons systems in a way I don't think we can talk about in an open session.

Senator GLENN. That is what we always run into. We cannot talk about them in open session, yet we are making great, huge, monumental decisions here.

Dr. DELAUER. We can talk about them in closed session. We can give you all the information now. You are talking about a Pershing system, which is a theater nuclear system which does not reach the velocities and the angles of reentry of an ICBM system. You want to take that kind of a front end and put it on an ICBM that has to have a very high degree of accuracy, which in turn requires a very high beta, as you are well aware. That means it has to be very careful that nothing is done to interrupt that trajectory, particularly from a structural standpoint on reentry.

All these things are possible, but you cannot do them now. We do not have one.

Senator GLENN. I think there is a divided body of scientific thought on this, and I know we cannot go into some of these things now, so let me go a different route here. I think there was reasonable support for the MPS system. I think there was political support for it here. It was probably going through. Was not the decision made to back off of that system mainly political rather than technical?

Secretary WEINBERGER. I am delighted that you asked that because I would like to hit that in the head just as hard as I can. It was not political at all. It was made entirely on the basis of the ineffectiveness of that system. That system played into the strong hand of the Soviets because it was a system which lent itself to destruction by a highly fractionated system of missiles. It was a system which provided, as you know, for 4,600 shelters, none of them hardened, and 200 missiles, not the 100 we proposed, but 200 missiles, would have been deployed among those 4,600 shelters.

You would have opened it up every year so the Soviets could look to see where they were, and then they could be moved around by these great lumbering trucks, and you would not have had any ability whatever to protect that system. A Soviet first strike could easily have expended the missiles necessary to destroy all of those silos. It was canceled for that reason. It was not a survivable system. It was not a system which took advantage of many Soviet weaknesses or incapacities. Its design played right into their strong hand of fractionation.

Senator GLENN. Well, I think as you are both aware, and as I have been pushing for the last 3 or 3½ years—in fact, I brought it to a vote on the Senate floor July 2, I believe it was, 1980, that we do away with the MX and go to a system that I think is really practical—the mobile system—and we are moving in that direction somewhat with the new proposals here. The MDS was a trend in that direction. I did not get many votes when I brought it to the floor, but I still think

that we get the greatest deterrence at the cheapest cost by going to an honest to goodness mobile.

It is a system that gives us fits when the Soviets use it, the SS–20, and it is a system that gives the Soviets fits when we propose putting a Pershing II in Europe. Both mobile systems are quite acceptable. The only reason that anyone has ever given me in the Pentagon in the last administration or this as to why that was not better was the social interface. Some believe Americans would not accept such a system.

And we have agreed that it would be cheaper, and when you could use this in an emergency-type situation to go wherever it was needed, it would mean that the only way the Soviets could attack this country would be if they barraged the whole blooming United States, which in my book provides us with the maximum deterrence possible.

Secretary WEINBERGER. Senator, for the reasons you cited we do not go to it because we do not have it. We do not have an intercontinental mobile system.

Senator GLENN. But we could have.

Secretary WEINBERGER. I do not know whether we could have it or not. We certainly could not have it in time to repair the gaps in our deterrent capability now, and that is the critical thing I face. I do not have the luxury of saying that it would be nice to do this or nice to do that.

Senator GLENN. Mr. Secretary, we have hunted for 3 years to try to find a place to hide the 192,000-pound MX. We have tried many different systems, and to think that we can consider that missile without considering its basing mode just defies rationality.

Secretary WEINBERGER. Nobody is suggesting that, Senator. What we are suggesting is that we go ahead with the production of the missile and that we deploy it in the way the President has recommended. Now, if the Congress feels that it has not had time to consider that basing mode and it wants more time to consider it, I am sure that the President would be the first to say that that would be fine. He would have no objection to that.

What we do not want to do is to lose the production time or the ability to meet the schedules, we must deploy this counter to the strength that the Soviets already have deployed. They have deployed their fifth generation missile while we are on our third. The need to do that as quickly as possible is of overriding importance in our opinion.

Senator GLENN. OK. That is a good point that you brought up, the testing and all that, because I think it is very appropriate here. If you get into testing, at what point then are we locked into that being our one new missile, and we do not have the option to go back to a real mobile?

Secretary WEINBERGER. Senator, I do not know how many options you have. We have spent 10 years debating, discussing, and developing the MX missile, long before we got here. We have some $4.2 billion into it. If the will of the Congress is to abandon all of that and try something else, obviously, that would be respected. I certainly could not recommend it. We spent a lot of time in the development of this plan, in looking at a so-called common missile or a small missile, and we had very negative results on both of those.

Senator GLENN. But, Mr. Secretary, we spent $4.2 billion in 10 years and still do not have a basing mode.

Secretary WEINBERGER. No, you have a basing mode proposal, sir, before you, and you could certainly consider it. You had a previous one which this administration felt was not survivable, and we have developed one that we believe is. So there is not all that much delay. We were forbidden, as you know, to consider two others, and we were also given a deadline, and within those parameters I think we have met the responsibilities and have proposed to you a basing mode that we consider survivable and that we would be delighted if you would consider.

Senator GLENN. I know we have some serious disagreement on this, and I have been through all of the technical arguments for it, and I agree with whoever it was who said a couple of days ago, that we have already tried Dense Pack, and it was called Pearl Harbor.

Secretary WEINBERGER. That is a totally inapt simile, if I may characterize it by a bit of understatement.

Senator GLENN. I think it is a very apt one myself, because from all the indications I get, we could get through a Soviet Dense Pack as I understand it, and I know you disagree with that, but I think we have systems now that could do that. I think if we are going to something, we should go to a mobile, where we really do have some deterrence, where it gives them the greatest pause from ever thinking that they could have a first strike against this country.

The CHAIRMAN. Thank you, Senator Glenn.

Senator Tsongas.

Senator TSONGAS. Mr. Chairman, there is a great deal of disagreement by the technical experts on Dense Pack, and we have seen much of that today. I think a far more interesting issue is a political environment in which we find ourselves, and that was, I think, the administration is rapidly getting to the point of having power without a mandate. The discussion that has taken place in the last 2 weeks, in my mind, never would have happened a year and a half ago, where there is change and not the technicalities of MX or the basing mode scheme. What has changed is the politics. There is a dissipated mandate in the country for this current level of defense spending, and there is an increased commitment to arms control, neither of which is shared by the administration, and I think that we are rapidly past the point where these things can be talked about purely on technical grounds.

What I find fascinating is the phenomenon of distancing shown by Republicans in the last few months, and which in the MX is the run vehicle, and to perform that political miracle, and it seems to me that there will be no MX absent a clear sense of commitment for arms control, and so when the chairman raised the two issues of the Peaceful Nuclear Explosions Treaty and the Threshold Test Ban Treaty and you coupled that with SALT II, the clear unwillingness on the part of the administration to embrace any of those three, I think, is fatal to MX.

I think they are intertwined, not because of the technicalities, but because of the politics, and I think the mandate that the administration had when it took office is gone, and what I find troubling about that is how you get any kind of rational discussion if we are engaged basically in pendulum swings.

I just throw that out, because even though I was one of those who was most actively opposed to the level of defense spending, I think there is also a point at which you go beyond rationality on our side, and I am really troubled by that.

Secretary WEINBERGER. First of all, I would like to challenge as strongly as I can your suggestion that the administration is not committed to arms reduction. We have, I believe, developed a more complete commitment and a more complete and drastic set of proposals leading toward major and real arms reductions than have been presented to the American public by any other administration. I am proud of it, and I hope that we can secure enactment of it in Geneva.

You referred to the SALT Treaty. The problem with the SALT Treaty and the reason the administration does not support it is not that it provides for arms reduction. All of the Soviet expansion and all of their arms buildup has been carried out within the parameters of SALT II. It is an ineffective attempt to control arms.

What we want is an effective way of reducing arms on both sides, and that is why we think the proposals that the President has put forward at Geneva are not only entirely appropriate but also represent a major change and a major shift. We very much hope that they can be adopted, and we are working on them just as hard as we can. You heard General Rowney and others tell you the status of the negotiation with respect to mandates or lost mandates or levels of defense spending.

I do not think it is fully appreciated what has happened here. The President in March 1981 submitted a 5-year defense program to the Congress. The first year of that was pretty well completely enacted. Out of that 5-year program the President himself has reduced $41 billion, and we have planned to save and expect to save through management improvements and budgeting procedures and procurement, multiyear procurement, and all of the other things that we have done, another $53 billion.

I do not believe that that puts us anywhere near a level of defense spending that should either shock anyone or be castigated. It is a level of defense spending which is obviously higher than anyone would like, but it is a level of defense spending which will not get us military superiority of any kind. It is a level of defense spending which will restore the deterrence strength that we need to preserve the peace, and that is what we are trying to do and why we are pushing it as hard as we can.

The House took $18 billion out of the 1983 appropriation bill. The Senate has not yet acted on that. The Senate committee did not take that amount out. So all of this extremely loose and, if you will pardon, extremely inaccurate talk about these unacceptably high levels of defense spending, I think, misses the mark completely. The worry is that we will be left with all the reductions that have been made and the reductions that are being talked about by the House committee. They will leave us with an inability to regain the deterrent strength that we need and that has preserved the peace. If we lose that deterrent strength, then I think the danger to all of us and indeed the free world increases very rapidly.

Senator TSONGAS. But if I might say, I think I have said this publicly, that the President's Eureka College speech, if given by a liberal

Democrat, would have been hailed because it does talk about reductions, and I think it was a major step forward. The problem is the gap between that speech and the perception of serious movement. Now, when a mandate begins to dissipate, although you can make the argument from a societal point of view it is irrelevant, the arguments that are made, and I think what is needed is confidence building.

The two treaties suggested by the chairman in SALT II, I think, are essential in that process, and I just wanted to make that statement, because I think that the sands under your feet are rapidly eroding, and I think it is going to be much more difficult for you to make rational arguments given what I think is a real skittishness on the part of many Republicans, let alone the Democrats, to show a commitment to arms control, and I just throw that out for whatever it is worth.

Secretary WEINBERGER. I do not see how a more firm commitment to arms control can possibly have been made. I certainly do not think there is the slightest gap between the President's talk that you referred to and the proposals that he submitted and which we are pushing as strongly as we can at Geneva, both at the intermediate range level and at the strategic level. It would seem to me that there is no better way of demonstrating that.

I would also challenge, though I understand both of us are guessing, your assumption that any mandate has been lost. In this body, the same relative allocation of seats remains after a national election, and I do not see that that is an indication of a lost mandate. Obviously it is enormously important that the people of the United States and the Congress of the United States understand the nature of the growing threat, and the need to do something about it. We must continue to push and will continue to push.

Senator TSONGAS. Mr. Secretary, one thing we can monitor with confidence are blood pressures, and if you take the blood pressure of the Republican side of the aisle of the U.S. Senate, you will notice an increased vulnerability.

My time is up, but I would just like to, if I might, just add one point, since everyone else took 9 to 10 minutes in their round. There is serious discussion technically about the issue of fratricide.

Secretary WEINBERGER. I am sorry. The issue of what?

Senator TSONGAS. Fratricide. There are many people with marvelous backgrounds who argue both sides of this issue, and as you know, the Townes Report raised this as one of their concerns, and Brown and Schlesinger and others have done so as well. I would like to insert in the record an analysis of Dense Pack vulnerabilities put together by two people at MIT, Joe Romm and Kosta Tsipis, who have remarkably good reputations, which presents one side of the argument. I happen to share this view. I would like the record to reflect that. So that there are people who have solid technical and academic credentials who would argue that indeed if we deploy Dense Pack, the Soviets have the capability to beat the system. I would ask that this be put in the record.

The CHAIRMAN. Without objection, it will be incorporated in the record.

[The material referred to follows:]

# ANALYSIS OF DENSE PACK VULNERABILITIES

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Program in Science and Technology
for International Security

Report No. 8

Department of Physics

Massachusetts Institute of Technology

Cambridge, Massachusetts 02139

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Preface.

The format of this report is somewhat different than the previous PSTIS publications. Rather than include the technical and analytical details of the discussion in the main text, we have segregated them in footnotes and an extended appendix that describes the Monte Carlo calculations we performed to test the sensitivity of our results to changing performance characteristics of Soviet weapons. The reader is strongly urged not to omit the footnotes in reading this report. They include details that are significant to the final conclusion that Dense Pack is vulnerable to a variety of attacks.

The Monte Carlo program used to derive the results of Appendix I was written by Mr. Fred Helenius. We would like to thank him for his help.

The Authors

1. Introduction

Intercontinental Ballistic Missiles (ICBM's) are based in reinforced concrete silos that offer protection against enemy attack. Currently the U.S. 1,000-missile (2,100 warheads) Minuteman force is based in silos capable of withstanding about 2,000 pounds per square inch (psi) overpressure. Their destruction requires the Soviets to achieve accuracies of several hundred feet in the delivery of each of one to two thousand warheads (of the 1-megaton size) if they wish to destroy all of these protective silos with high probability.

The Reagan Administration believes that Soviet missiles have attained such accuracies; therefore they represent a potential threat to the Minuteman force. To counter this potential threat, the Administration has endeavored to design a more survivable basing mode that can be built within 5 to 10 years to house the new MX missile, now being developed.

Designing a system capable of withstanding a variety of attack scenarios requires an evaluation of the current threat, the threat likely to exist by the time of deployment, the threat in the years immediately after deployment, and the endurance requirements of the basing system. The missile system's survival potential must be calculated by determining the fraction of the silo-based missiles capable of launching successfully after a Soviet attack. A successful launch requires that a silo must be free from obstruction, contain an intact, operational missile, and enjoy a robust command, control, and communications link to the National Command Authority, from a few seconds to a few months after the Soviet attack. Lastly, the optimal basing mode, once determined, must be politically acceptable, since a system that is not approved by the government will never be deployed.

The closely spaced basing concept, or Dense Pack, attempts to address

the "survivable-against enemy attack" criterion by exploiting a phenomenon known as fratricide. Fratricide is a term used to describe the multitude of effects caused by the detonation of an incoming nuclear warhead that are capable of destroying other nearby nuclear warheads before they reach their targets.

These effects include the flux of nuclear radiation, the thermal (heat) effects, the blast shockwave, and the ejecta and dust thrown into the air in the vicinity of the nuclear detonation. As with all weapons' destructive effects, these fratricidal effects weaken with distance, so that the farther apart one incoming Soviet warhead is from another, the less likely it is that the first warhead's detonation will destroy or damage the second warhead before it can detonate. Therefore, the closer the target silos are to one another, the closer together incoming Soviet warheads will have to be when they arrive at their targets, and the stronger the fratricidal effects of their detonations will be to other incoming warheads. This is the working principle behind Dense Pack, and it is this principle that the report attempts to evaluate.

The 100 silos of Dense Pack will be placed about 1,800 feet apart in an array designed to optimize the survivability of the MX by maximizing the fratricidal effects of a Soviet attack. The 100 silos will be "superhardened": the buried part of the silo will be capable of withstanding 5000 psi overpressure, and the silo cover would be capable of surviving 10,000 psi. The Dense Pack silos will be arrayed in a long column oriented in a north-south direction, covering, according to a description in the November 5th New York Times, about fourteen square miles of land. Dense Pack is designed compactly in order to maximize the effects of fratricide, thereby maximizing the difficulties and costs the Soviets would face in trying to defeat this basing system and destroy the 100 MX missiles (1,000 warheads) based there. Moreover, the compactness of Dense Pack endows it with great political advantage since it can be placed

within an existing Air Force base and thus avoid the public objections that the Multiple Protective Shelter System proposed by the Carter Administration encountered in Utah, Nevada and other western states.

2. Fratricide effects

The detonation of an incoming nuclear warhead on a re-entry vehicle (r.v.) creates effects that may destroy a nearby r.v. These are called the fratricide effects, and may be loosely divided into three groups determined by the time during which they are the primary mechanism for fratricide: 1) the prompt effects (from several tens of microseconds to a few milliseconds); 2) the near-prompt effects (from a few milliseconds to about a minute); and 3) the longer-term effects (from one minute to perhaps 20 minutes).

The prompt effects follow the warhead's detonation instantaneously and are extremely short lived (have relatively little lethal effect after the first millisecond) but propagate at or near the speed of light, thus traveling between 200 and 1,000 feet per microsecond.[1]

These effects include the neutron flux, the electromagnetic pulse (EMP), the electromagnetic radiation from the initial flash, consisting mainly of soft x-rays, but not all the gamma rays. The electromagnetic pulse can induce high voltages across nearby incoming r.v.'s but the housing of the r.v.'s could act as a shield for the interior electronics and so the EMP may not be a serious fratricide effect. The most lethal forms of electromagnetic radiation released by a nuclear detonation are the $\gamma$-rays and the thermal radiation. The compactness of Dense Pack makes it a likely target for multi-megaton Soviet warheads (like the single 25-megaton warhead the 300 highly accurate SS-18 missiles can carry), and since for these warheads only a small fraction of the total gamma ray dose is emitted in the first few milliseconds, gamma rays will be considered a near-prompt effect.[2] As for the thermal radiation, a nuclear detonation releases this radiation with a characteristic double pulse -- the first pulse containing only about 1% of

the total thermal radiation.[3] Even though the initial pulse may last over one-tenth of a second for a multi-megaton detonation, clearly most of the thermal radiation is released in the second pulse, which follows the first by several seconds in large yield bursts. Thus, thermal radiation will also be considered a near-prompt effect.

By far the most lethal prompt fratricide effect is the neutron flux, virtually all of which is created during the fission or fusion process within less than one millionth of a second. The neutrons may destroy the electronics inside a nearby r.v. with fluxes as low as $10^{11}$ to $10^{12}$ neutrons/cm$^2$ but proper circuit design can protect electronics against fluxes of $10^{13}$ neutrons/cm$^2$ or more.[4]

The plutonium trigger of the typical multi-megaton fission-fusion-fission thermonuclear weapon, however, begins to fission when exposed to another warhead's neutrons, thus heating up, much in the same way as if it were actually detonating, because of the kinetic energy of the fission fragments. For neutron fluxes in excess of $10^{17}$ neutrons/cm$^2$ the plutonium trigger may heat up to temperatures in excess of 1,000 degrees Centigrade and fail to work properly.[5] Thus the tolerable neutron flux for an incoming r.v. may be only $10^{15}$ neutrons/cm$^2$, and probably no more than $10^{16}$ neutrons/cm$^2$.

The average number of neutrons per square centimeter a distance R(in feet) from a nuclear detonation of yield Y (in megatons) is given by[6]

$$N(n) = 2 \cdot 10^{22} \cdot \frac{Y}{R^2} \cdot \exp(-R \cdot \rho / 780)$$

where $\rho$ is taken to be 1.1. At 2,700 feet from the detonation of a 25-megaton weapon, the flux is about $10^{15}$ neutrons/cm$^2$ and the neutrons arrive no earlier than 20 microseconds after detonation. The neutron flux from a 25-megaton weapon is not reduced to $10^{13}$ neutrons/cm$^2$ until R equals 5,000 feet. Thus, neutrons may have prompt fratricidal effects on incoming r.v.'s for great distances within only a few tens of microseconds of the detonation.

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Within milliseconds of the detonation of a multi-megaton warhead, the prompt fratricidal effects have subsided to the point that the near-prompt effects become the dominant cause of fratricide. The near-prompt effects last on the order of seconds and include the shockwave and wind from the air blast, the thermal radiation and fireball, and the gamma radiation.

Following a detonation, gamma rays are produced over a span of several seconds from the decay of the fission products. The resulting dose of gamma rays is a complex function of time, weapon yield, and distance from detonation. Although for multi-megaton weapons the doses can be high enough to damage electronics, the fratricidal effects of blast and thermal radiation are more severe and much more widespread, so that the effects of gamma rays on incoming r.v.'s can be safely neglected.

The detonation of a nuclear weapon creates high temperatures and high pressures in the immediate vicinity of the weapon. The resulting fireball and high pressure shockwave propogate away from the detonation point faster than the speed of sound. This extremely hot fireball is a very hostile environment for an r.v. since it can destroy the r.v.'s heat shield.

Several mitigating points must now be made. First, the incoming r.v.'s have been designed to withstand the tremendous heat caused by the re-entry into the Earth's atmosphere, and so, of all the fratricidal effects of a nuclear detonation, heat is the one the r.v.'s are best prepared to survive.

Second, although traveling through the fireball in its initially superhot state might destroy an incoming r.v., the fireball, acting like a hot-air baloon, rises quite rapidly away from the detonation point (the

fireball from a one-megaton detonation rises at an average rate of about 440 feet per second for the first minute, thus rising 26,000 feet in the first minute after the detonation). After attaining its maximum temperature within a few seconds, the fireball cools quite rapidly.

Beyond this time, it is the blast effects (shockwave and wind) that can still damage or destroy an r.v. several seconds after the detonation. The fratricidal effects of the shockwave are more extensive in space as well as in time. The fireball from a multimegaton nuclear detonation can have a diameter of over one mile; but the blast shockwave breaks through the fireball within milliseconds of the detonation, and continues to travel outward much faster than the fireball's surface expands at that time.[7] For these reasons, the blast will be considered to be the primary near-prompt fratricidal effect of a multi-megaton detonation.

The blast effects consist of two parts, the "overpressure" and the "dynamic pressure." The overpressure is pressure in excess of atmospheric pressure created by the high density shockwave, and it can crush a nearby r.v. It is measured in pounds per square inch (psi), and for a 25-megaton ground blast, 5000 psi (the overpressure presumably needed to destroy a superhardened Dense Pack silo) occurs at about 2,600 feet while 5 psi (the overpressure capable of demolishing a house) occurs at well over 10 miles.[8] The dynamic pressure comes from the physical movement of the air molecules in the shock front. It is a wind that can reach speeds of thousands of miles per hour and last for several seconds, eventually slowing down with time. This wind follows the overpressure immediately and can blow incoming r.v.'s off course.

Specifically consider the effects of the detonation of a 25-megaton warhead: At a distance of 2,600 feet (the 5000 psi "kill" radius), the overpressure shockwave arrives in about 50 milliseconds. There is little doubt that 5000 psi would destroy an incoming r.v. At a distance of 4,500 feet,

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the 1000 psi overpressure shockwave would also probably destroy an incoming r.v. and it would arrive about two-tenths of a second after the warhead's detonation. The shockwave reaches 10,000 feet in about 1.5 seconds with an overpressure of 100 psi, which might damage an incoming r.v., or might send it tumbling, since it would be subjected to the powerful wind that reaches velocities in excess of 1,400 miles an hour and lasts up to 7 seconds. Since, by comparison, the r.v. is traveling at about 3,000 miles an hour, this wind would cause a severe degradation in warhead accuracy, even if the warhead survived. Even 4 miles from ground zero and 7 seconds after detonation, the shockwave has an overpressure of 20 psi and the winds last about 10 seconds and reach a maximum velocity of about 500 m.p.h. While an incoming r.v. might very well survive this environment, it would no longer be on its intended trajectory.

Thus the near-prompt effects, dominated by the overpressure and dynamic pressure, can have widespread (in space and time) fratricidal effects that last several seconds at distances up to a few miles from the detonation of a multi-megaton weapon. Table V serves to demonstrate that the fratricidal effects of the blast wave can follow the fratricidal effects of the neutrons within tens of milliseconds, and therefore it may be difficult to send in waves of warheads after the neutrons but before the blast.

Table 1

PROMPT - Neutrons - Yield: 25 Megatons

| Distance from detonation | Approximate arrival time after detonation | Neutron flux | Likely effect |
|---|---|---|---|
| 1,000 ft. | .000006 seconds [9] | $10^{17}/cm^2$ | Destruction of Pu trigger |
| 2,700 ft. | .000020 seconds | $10^{15}/cm^2$ | Probable destruction of electronics |
| ~4,500 ft. | .000030 seconds | $4 \times 10^{13}/cm^2$ | Possible destruction of electronics |
| 10,000 ft. | .000060 seconds | $4 \times 10^{9}/cm^2$ | No fratricidal effect |

NEAR PROMPT - Blast - 25 Megatons

| Distance | Arrival Time | Maximum Overpressure | Maximum Wind | Total Duration of Dynamic Pressure | Likely effect |
|---|---|---|---|---|---|
| 2,600 ft. | .05 sec. | 5000 psi | - | - | Destruction of r.v. |
| 4,500 ft. | .21 sec. | 1000 psi | - | - | Probable destruction of r.v. |
| 10,000 ft. | 1.5 sec. | 100 psi | 1400 mph | 7 seconds | Certain degradation of accuracy |
| 20,000 ft. | 7.0 sec. | 20 psi | 500 mph | 10 seconds | Degradation of accuracy |

Between 10 seconds and 60 seconds, the blast wave will have been reduced to an overpressure of about 2 psi and winds of 70 m.p.h. and the fireball will have cooled to the point that it is no longer glowing visibly. The fireball will have risen several tens of thousands of feet above the point of detonation.

At this point, the longer-term effects become the predominant means of fratricide. These effects are associated with the dust and debris that a large nuclear warhead injects into the atmosphere when it is detonated near the Earth's surface. A surface burst will create a blast crater whose diameter depends on the warhead's yield, the height (or depth) of burst, and the soil type. The longer-term fratricide effects are caused by the debris that the detonation ejects from the crater directly and by the dust particles that are sucked into the mushroom cloud and lifted to high altitude.

The larger particles which return to the ground relatively rapidly can shatter an incoming r.v. as it moves through the dust cloud at high velocity, thereby destroying the r.v. directly. Smaller particles, which stay in the atmosphere longer, may damage the r.v.'s heatshield or nosecone, leading either to the destruction of the r.v. or degradation of its accuracy.

The longer term fratricidal effects of the debris are a complicated function of time, weapon yield, height of burst, soil, r.v. design, and local wind patterns.

For bursts directly on the Earth's surface -- ground bursts -- large particles would be thrown out of the crater into the air; these might stay in the atmosphere and be capable of puncturing incoming r.v.'s for minutes. Also, large quantities of dust would be injected into the atmosphere, and they may pose a threat to incoming r.v.'s for perhaps as long as 30 minutes. We consider 25-megaton warheads detonations below 1,300 feet to be "cratering bursts", between 1300-8000 feet as "near-ground bursts" and over 8000 feet as "air bursts".[10]

For bursts of sufficient altitude so that the fireball does not touch the ground -- air bursts -- there will be no appreciable cratering. Thus no large particles and far less dust would be injected into the atmosphere.

A mitigating factor concerning the effects of dust deserves mention: the incoming r.v.'s are flying toward Dense Pack at a fairly small angle (below 30°) and would tend to fly below the portion of the dust cloud where fratricide effects last longest.[11] For this reason, it would be best to assume that the longer term fratricidal effects last no longer than 20 minutes for ground bursts. Moreover, the duration of the longer-term fratricidal effects decreases with increasing detonation altitude to the point that, for an air burst, the longer term effects will have little destructive effect on incoming r.v.'s beyond the near-prompt or blast effects.

The prompt, near-prompt and longer-term fratricidal effects of a nuclear detonation cover a time span from microseconds to tens of minutes. For the distances characteristic of Dense Pack, the near-prompt effects follow the prompt effects within tens of milliseconds, and the near-prompt effects overlap in time with the longer-term effects. An attacker of Dense Pack, in order to avoid fratricidal effects, must either detonate all the r.v.'s aimed against the 100 Dense Pack silos before the prompt effects take place or after the longer-term effects have subsided. The former can be achieved by detonating all incoming r.v.'s within about one microsecond. The latter requires sending in one or more waves after the longer-term fratricidal effects of the first wave have subsided. The waiting time for a second wave ranges from 20 minutes if the first wave consisted of cratering bursts to perhaps under 10 minutes if the first wave consists of higher altitude bursts. Simultaneous detonation of incoming warheads within a microsecond is technically possible if the warheads are provided with a timer to detonate them. Clocks with one microsecond precision are quite routine and can easily fit in an ordinary r.v. Pre-determining the location of the r.v.'s at the instant of their simultaneous detonation is a separate problem that will be discussed in detail further on.

3. Silo vulnerability

The silos of Dense Pack will be separated by about 1,800 feet. Since the 5000 psi kill-radius for near-ground bursts of a 25-megaton warhead (already tested on the Soviet Union's accurate SS-18's) is 2,600 feet, such warheads would be suitable for an attack on Dense Pack. A variety of potential kill mechanisms for missiles in silos would be created by the explosion of such a warhead 2,600 feet away.

The overpressure of 5000 psi creates a force of about 360 tons per square foot on the silo. In addition, it causes violent motion of the ground and the silo, creating ground accelerations and stresses larger than those of the most destructive earthquakes. The acceleration due to gravity is 1 g; it is also the acceleration the ground experiences during an earthquake of magnitude 7.6 on the Richter scale. At 2,600 feet from a 25-megaton detonation the ground acceleration can be over 300 g's (depending on soil type), and the vertical displacement of the ground can be on the order of feet.[12]

The size of the crater excavated by a 25-megaton surface detonation depends on soil type, but typical dimensions would be a radius of 1,250 feet and a depth of about 600 feet.[13] Some of the excavated volume of soil will linger in the air for minutes, causing the longer-term fratricidal effects. But most of it will fall back on the ground surrounding the point of detonation. This mass of "ejecta" reaches a maximum height of about 150 feet above ground level at a distance 1,600 feet from the detonation point. The height decreases rapidly with distance, but at 2,600 feet from ground zero, it has a height of about 30 feet, and at a distance of 3,000 feet the ejecta is still 18 feet high.[14]

The 25-megaton ground burst can thus incapacitate an MX missile in its hardened silo at a distance of 2,600 feet in at least three different ways: by destroying the silo and missile directly with the overpressure shockwave; by covering the silo with 30 feet of soil; or by subjecting the missile to accelerations that its structure cannot support, thereby crushing or shattering it.

The guidance system of the missile, which is said to be able to withstand accelerations of no more than 30 g's, will be probably damaged at that distance.

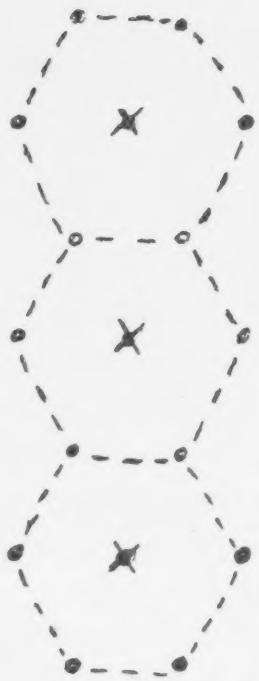
As detonation altitude increases, the distance from the hypocenter (the point on the ground directly beneath the detonation) at which the overpressure is 5000 psi does not decrease and instead it actually increases to perhaps over 2,700 feet for an altitude of between 1,000 and 2,000 feet. This well-known phenomenon (that peak overpressures are optimized by detonating at certain altitudes) stems from the fact that part of the shockwave of a nuclear burst reflects off the ground and intersects the remainder of the shockwave, creating increased overpressures. As the burst altitude is increased beyond 2,000 feet, there is a decrease in the distance from ground zero at which the overpressure is 5000 psi. Yet, at an altitude of about 3,000 feet, the 5000 psi shockwave still extends to over 2,400 feet.

Thus the 25-megaton warhead on an SS-18 has a kill radius for Dense Pack silos of 2,600 feet or more for burst heights of between 0 and 2,500 feet.

If, as proposed, Dense Pack silos are arranged in a hexagonal grid, with each silo about 1,800 feet from its six neighbors, then one 25-megaton warhead can destroy up to 7 or 8 silos, depending on its exact point of detonation.

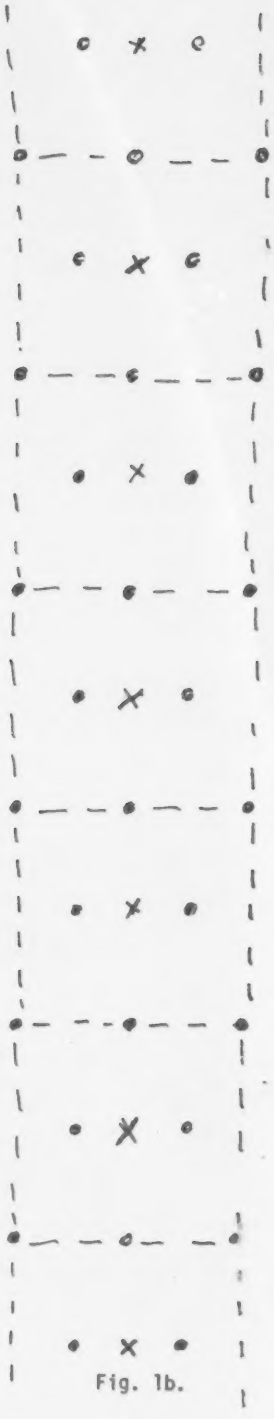
To destroy 7 silos (using what we define as "7-kill" targeting) a 25-megaton warhead is aimed at a silo which is at the center of a hexagonal array. The six next-neighbor silos are at 1,800 feet, well within the assured destructive radius of the weapon. (See Fig. 1a) If the weapon is ground burst in 7-kill targeting, not only will 7 silos be destroyed, but an additional six others will be covered with ejecta -- 2 silos with about 16 feet and 4 silos with about 9 feet of ejecta. All six of these silos will be in the region of the ground that will suffer permanent plastic deformation because of the explosion.

To destroy 8 silos, using "8-kill" targeting, a 25-megaton warhead is



7-kill
targeting

Fig. 1a.



8-kill
targeting

Fig. 1b.

aimed at a point half-way between 2 central silos. (See Fig. 1b). In this scheme, 2 silos are 900 feet from the explosion, 2 are 1,560 feet away, and 4 are 2,380 feet away -- all assuredly within the lethal radius of the weapon. If the weapon is ground burst in 8-kill targeting, 8 silos will be destroyed, and 4 others will be covered with about 14 feet of ejecta.

The accuracy of Soviet r.v.'s is not going to appreciably affect the end result of the attack. For example, an 800 foot miss in the 7-kill scheme will still destroy 7 silos, and even a 1,500 foot miss will turn a 7-kill attack into an 8-kill attack; thus inaccurate warheads can destroy as many silos as accurate warheads. This extraordinary vulnerability of Dense Pack to inaccurate r.v.'s is in marked contrast to the current basing mode of MM II and MM III missiles where inaccurate r.v.'s have little probability of destroying any silos.

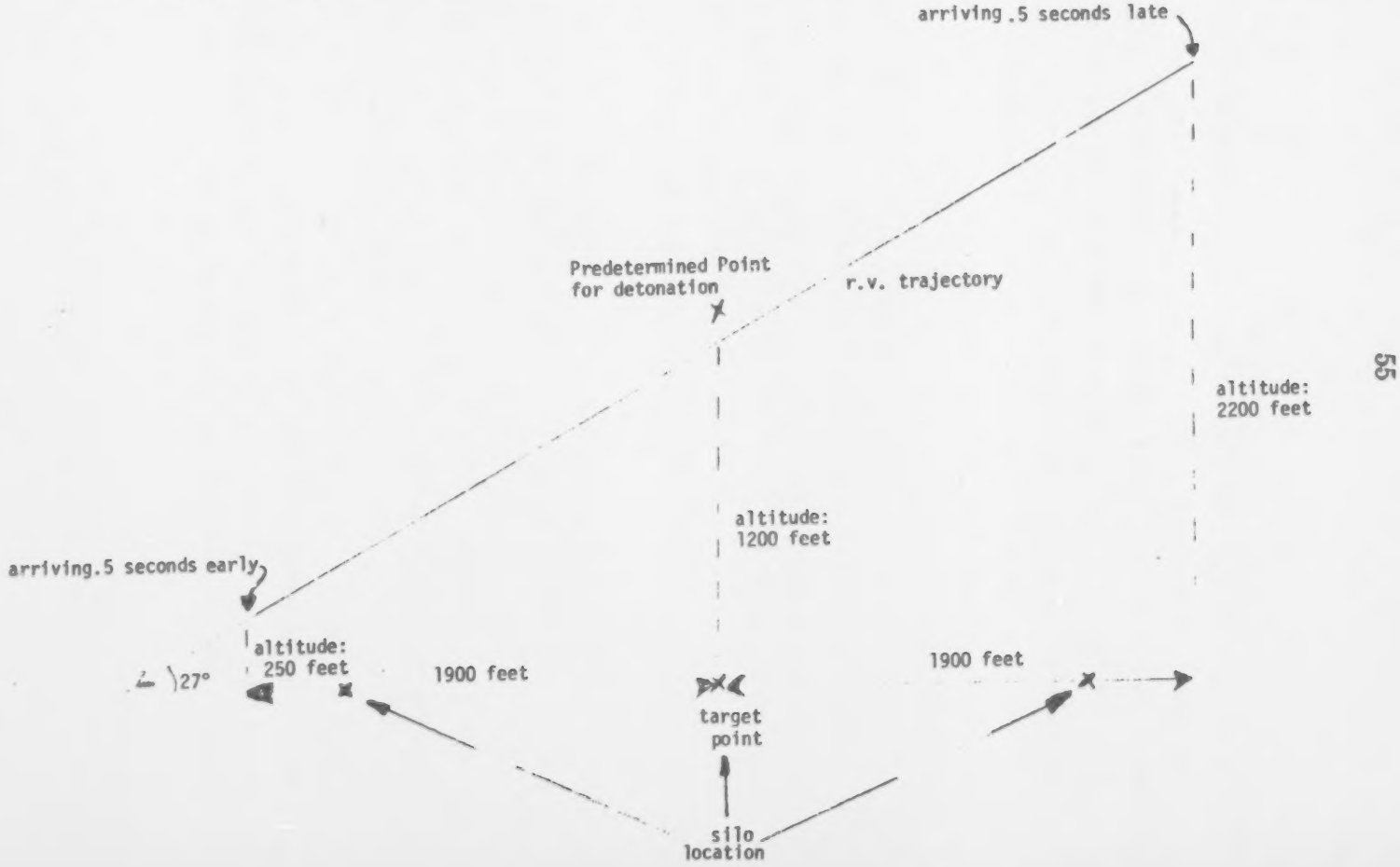
4. Potential Soviet attacks against Dense Pack

A perfect counterforce attack intended to destroy the totality of our 2,100 Minuteman warheads currently deployed on 1,000 missiles in silos would require at least 2,000 Soviet warheads (2 per silo). In all probability such an attack would result in more Soviet warheads spent than American ones destroyed since the operational accuracies of Soviet r.v.'s would probably prove inadequate for the task.[15] The compactness of Dense Pack, on the other hand, makes its 1,000 warheads on 100 closely spaced missiles a vulnerable target to a variety of small, well-planned, and well-timed attacks by the Soviets. We examine here four attack scenarios.

We first examine a scenario (7-kill targeting) using 60 Soviet r.v.'s. This is an extremely conservative attack that assigns 3 r.v.'s per target to compensate for possible unreliability of the r.v.'s, and shows that virtually all of the 1,000 MX warheads could be destroyed by these r.v.'s if aimed three each at the 20 aim-points (the centers of the 20 hexagons) of a 7-kill targeting scheme. We assume that the 60 Soviet warheads would be 25-megaton weapons carried on SS-18's. The 60 SS-18 silos could be wired so that they could launch the 60 missiles with such timing precision that the 60 r.v.'s would be at an altitude of between 200 and 2,200 feet over Dense Pack at a pre-determined time. This requires that all 60 r.v.'s arrive over Dense Pack within one second of this pre-determined time. Current Soviet missile accuracy indicates that their present timing accuracy could be as good as .25 second so that one second timing is not an unattainable requirement,particularly if only 60 single-warhead missiles are involved. Since the Soviet r.v.'s are traveling at an average speed of about 4,200 feet per second as they near their targets, one second timing uncertainty represents an uncertainty in position for these r.v.'s of about 4,200 feet.[16] At the pre-determined time

Figure 2

R.V. trajectory with ± 1/2 second uncertainty in detonation point



the 60 Soviet r.v.'s are then detonated simultaneously, triggered by clocks that have one microsecond accuracy. (This is off-the-shelf technology since clocks are available today that are accurate to one-thousandth of a microsecond). To avoid fratricide by any premature detonations, these warheads would not have contact fuses. We label this the "basic attack".

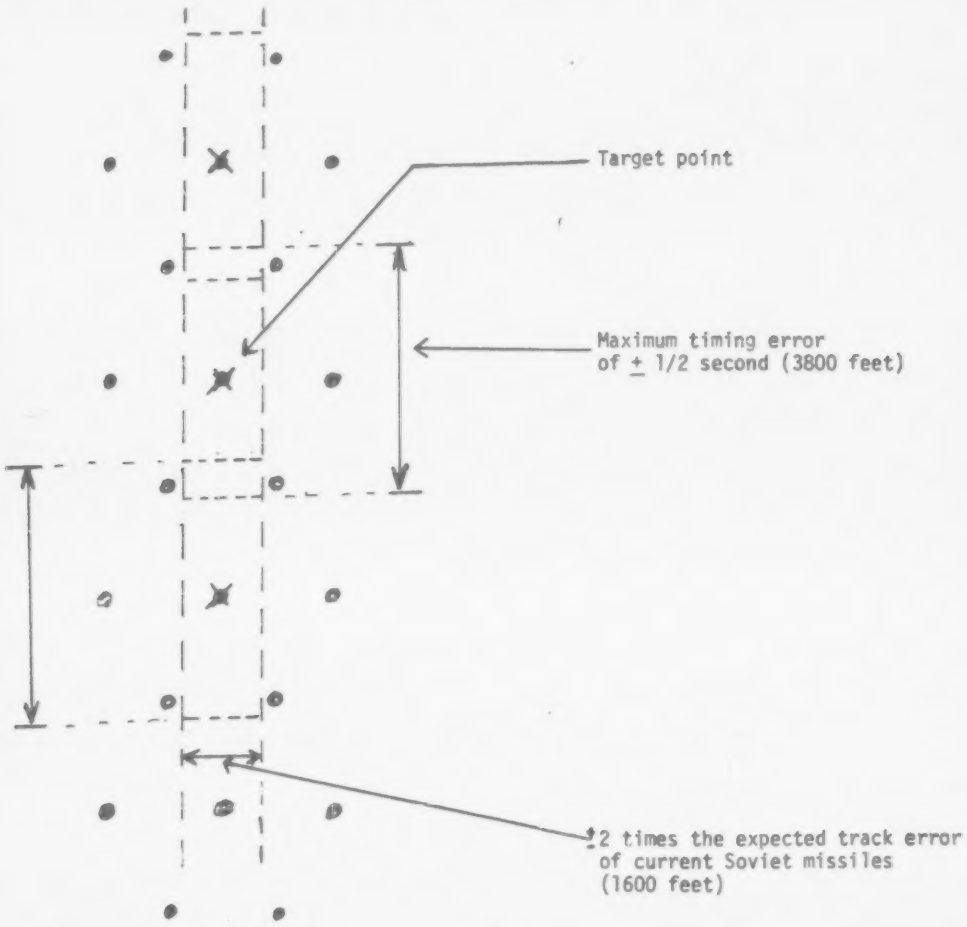
Thus the uncertainty in the location of the r.v.'s when they are all detonated simultaneously will be about 4,000 feet. Figure 2 illustrates this effect for one of the r.v.'s.

The 4,200 foot uncertainty in flight path translates into a 3,800 foot uncertainty on the ground (for r.v.'s coming in at a 27° angle). This is an uncertainty in range only. Perpendicular to the flight direction, the track error is always much less. With Soviet accuracy reputed to be about 850 feet (the CEP) today, the Soviets will have no difficulty keeping the track error of their r.v.'s within 500 feet.[17] The situation for one section of Dense Pack will then look as follows. (See Fig. 3).

Assuming the warheads obey a normal distribution about their aim-point, a 25-megaton warhead with an MX silo kill-radius of 2,600 feet will destroy the 7 target silos most of the time, and will destroy 5 of the 7 target silos virtually all of the time. Almost always these 5 silos include the row of 3 silos containing the target silo.[18]

In the 7-kill targeting every row with 2 silos is 1,800 feet from 2 separate aim-points. Thus the rows with 3 silos will usually be destroyed by the detonation of one of the three incoming r.v.'s targeted against them. Even if all three are overshoots (or undershoots) and therefore miss one of the rows of 2 silos, the likelihood is high that those 2 silos will be destroyed by one of the other 3 warheads targeted against the next row of three silos.

Figure 3
Rectangle of uncertainty for 7-kill targeting




Dots are Dense Pack silos. The 3800 foot by 1600 foot rectangle represents the full uncertainty in position that any Soviet r.v. would have if its target were the center of the 7 central silos, in the 7-kill targeting scheme considered in this text.

In this scheme, all of the rows with 2 silos are 1800 feet from two separate aim-points. Since each aim-point receives 3 warheads, each row with 2 silos is targeted 6 times.

The purpose of the clocks used to detonate all the warheads within one microsecond is to avoid the prompt fratricide effects. Since the fastest of the fratricide effects is neutrons, and since neutrons from the detonation of one warhead will travel less than 200 feet in one microsecond, there will be no fratricide between warheads separated by more than 200 feet. Since it is unlikely that very many warheads in this 60-warhead attack would come within 200 feet of each other (and since such close warheads would have destroyed the same silos anyway), the one microsecond clocks prevent any significant fratricidal effects from affecting the ability of the 60 warheads involved in the attack to destroy the Dense Pack silos.[19]

The purpose of sending 3 warheads to each target is to hedge against unreliable warheads. Since the Soviets are only using 60 warheads in this attack, they could take special care to insure that these were as reliable as possible. Even if the Soviet missiles proved to be only 70% reliable, however, this 60 warhead attack would still destroy virtually all of Dense Pack.

There are 20 target points in this attack. With an attack of 60 warheads (3 on each target point) that have a reliability of 70%, almost 80% of the target points would receive 2 or 3 warheads, and about 97% of the target points receive at least one warhead. For 20 aim-points, this means that there is only about a 42% probability that one aim-point receives no warheads, which would perhaps result in the center row of 3 silos surviving.[20] Since all the aim-points that receive 1, 2, or 3 warheads will very probably have all their 7 target silos destroyed, this attack of 60 Soviet warheads in a single wave would probably destroy at least 970 MX warheads on 97 MX missiles.[21]

This is a reasonable and perhaps even conservative estimate for two reasons. First, as seen earlier, inaccurate warheads often destroy more silos than planned,

not less. Some of the warheads that according to the analysis above may be off target might instead be within 2,600 feet of the 3 silos that are presumed to have escaped destruction. Second, even if this did not happen, the 3 remaining silos would probably be subjected to at least 3 blasts of a 2000 psi shockwave from warheads detonating on neighboring target points. The ground acceleration from one such shockwave can be over 100 g's depending on the soil. Whether the MX missile can take one such shock, let alone 3 or more, is not known, but it is very likely that any missile that did would be crushed by its motion with respect to the silo walls, and its guidance system would at the very least be rendered inoperative. In any event, it is clear that some of the 3 remaining missiles might be damaged or destroyed, and that therefore the postulated 60-warhead Soviet attack might very well destroy every single missile of Dense Pack.

The requirements for this attack are that the Soviets have 60 clocks accurate to one microsecond, and 60 warheads that are 70% reliable, and further that they can time their attack so that those 60 warheads arrive over Dense Pack all within one second.

It is important to emphasize three points. First, the Soviets probably have these capabilities today, and if not, they surely could develop such capabilities before Dense Pack is operational, considering the small number of warheads required for the attack.

Second, the key to this attack is the clocks, not the reliability or accuracy. The Soviets could expect to destroy the bulk of Dense Pack even if the timing of arrival of their missiles was poorer than one second because Dense Pack is uniquely vulnerable to inaccurate missiles (i.e. missiles with uncertain timing).[22] This is especially true for the latest configuration of Dense Pack. A greater uncertainty in the timing of r.v. arrival merely means a larger spread of the missiles in the direction they are traveling, from

north to south. Since the silos are arranged from north to south, mistimed missiles will still explode somewhere over Dense Pack and still destroy as many as 7 or 8 silos. Even if the Soviets were able to time the arrival of their r.v.'s over Dense Pack to only 3 seconds, assuming a normal distribution, about half of the r.v.'s would detonate within one second of the pre-determined time. Three second (or longer) timing uncertainty would only force the Soviets to change their attack plan slightly and use a few more warheads.[23]

The significant result of the previous analysis is that as long as Soviet r.v.'s are equipped with clocks that detonate them all within one microsecond, the Soviets can avoid all the fratricide effects and be sure of blanketing Dense Pack with enough powerful shockwaves to devastate it.

Third, although the above analysis is directed toward a long column array, it applies with equal rigor to most configurations, even if the separation distance between the silos is increased or decreased by a few hundred feet.[24]

A second attack scenario is for the Soviets to develop and use "soft-lander" r.v.'s in the 5 to 10 years before Dense Pack is deployed. Soft-landers are r.v.'s that descend through the atmosphere relatively slowly so that they can land on the ground without suffering any structural or operational damage. Once on the ground, these soft-landers can all be detonated within one microsecond to avoid fratricide as in the first attack. This soft-lander attack has the additional advantage that it avoids the time-of-flight uncertainties inherent in requiring that all 60 r.v.'s detonate within one second from landing. On the ground the 5000 psi shockwave kill radius is still 2,600 feet. Moreover, ejecta will still be 18 feet high even 3,000 feet away, so that even if 3 silos survived, they would probably be buried under 27 feet or more of ejecta. Because Dense Pack is so compact, and the kill radius for these warheads is so large, accuracy of the soft-landers is not a significant determinant of their effectiveness.

Soft-landing technology is feasible; moreover the argument that these relatively slow-moving soft-landers are vulnerable to a simple anti-aircraft defense system is negated when soft-landers are used following a few precursor air-bursts that would destroy or blind the radars of any defenses against them. They therefore represent a second effective method for attacking Dense Pack by avoiding fratricide.

A third scenario of Soviet attack against Dense Pack would be to develop Earth Penetrator Weapons (EPW's) which are now also considered technically feasible. An EPW carries a nuclear warhead and penetrates the earth before detonating. In the earth, the fratricidal effects of neutrons are virtually eliminated but those of the overpressure increase. Many of the destructive effects to silos, particularly cratering, are increased. One hundred EPW's targeted one on each silo would only need to have a clock accurate to one millisecond to avoid fratricide. Any operational problems caused by uncertainty in time-of-flight would automatically be overcome. Soviet EPW's could enter the earth near their target and then be detonated simultaneously (within only one millisecond) several seconds later.

Even if the warhead had to be reduced 40% in yield (to 15 megatons) to allow for additional structural strength needed in the r.v. for earth penetration, the crater from detonation at a depth of 40 feet would have a 1,400 foot radius. Thus with accuracies that the Soviets are said to have today, they could be sure of destroying virtually all of the MX silos by putting them directly in the crater.

Given the same reliability of 70% that we have assumed all along, this attack would destroy about 70 silos directly with cratering and have an extremely high probability of covering the other 30 silos with the ejecta from at least one warhead. At 1,750 feet from a 15-megaton warhead detonated at a depth of 40 feet, the ejecta reaches its maximum height of 150 feet. At a distance of 2,600 feet

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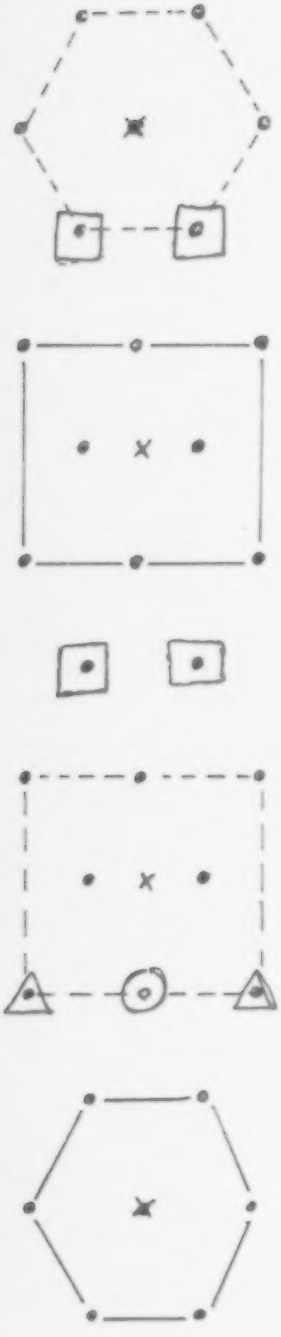
from the detonation the ejecta is still 50 feet high. Thus EPW's represent another feasible way the Soviets could defeat Dense Pack. Since any of the silos that survived the first wave of EPW's would almost certainly be covered by at least 50 feet of dirt, there would be no need for the Soviets to rush a second attack to destroy the few MX missiles that might remain operational, unless the U.S. used the Minuteman missiles to attack Soviet silos.

In the past, the U.S. Air Force has specified that MX basing modes must offer enduring survivability to the missile for up to two months. Numerous earlier proposed basing modes could not fulfill this requirement and as a result were rejected. Dense Pack cannot endure for such a period of time. Power and air-conditioning facilities necessary to keep the missiles operational inside their silos cannot function independently for extended times, even if by some miracle several MX missiles remained operational in undamaged unobstructed silos. Therefore, the Dense Pack system does not meet the endurance requirements specified by the Air Force.

The specific configuration of a narrow column described in the New York Times is especially vulnerable to a fourth attack scenario because its width is at most about 3,600 feet, while the kill-diameter of a 25-megaton warhead is 5,200 feet. This allows the Soviets to use a two wave walk attack that avoids fratricide by spacing the warheads about 11,000 feet apart, which is a great enough distance to avoid prompt and near prompt effects. The blast wave from a 25-megaton warhead takes 1.7 seconds to travel 11,000 feet; the attacker must time the arrival of consecutive warheads within this interval. This attack requires about 33 warheads in two waves 20-30 minutes apart. (This interval precludes the pinning down of Soviet ICBM's by American SLBM r.v.'s.)

The result of the first wave of 18 warheads targeted 3 to each aim-point is illustrated in Figure 4. The warheads are ground burst beginning at the southern-most target and proceeding north, each warhead detonating within 1.7 seconds after

Figure 4



This is a portion of the 2-wave walk attack described in the text.

The first wave destroys 46 silos (in solid lines),
buries 4 silos with 16 feet of ejecta (circles),
14 silos with 14 feet (squares), and
8 silos with 9 feet (triangles).

The second wave destroys another 38 silos
(in dashed lines), and piles more ejecta
on the remaining 16 silos leaving:
2 silos under 32 feet,
8 silos under 28 feet,
4 silos under 18 feet,
2 silos under 14 feet.

the previous one. Because this attack is so small, the Soviets would have high confidence that each of the 6 aim-points would receive a working warhead.[25]

After the first wave, even with accuracies the Soviets are given credit for today, the Soviets could expect to destroy about 46 silos directly and cover an additional 26 silos with about 9 to 16 feet of ejecta (18 of those silos will have 14 or more feet of ejecta covering them). Thus, perhaps as many as 720 MX warheads would be unusable (although some just temporarily) after this first wave of only 18 Soviet warheads.

This first wave does not require clocks, it does not impose a difficult timing constraint on the Soviets, and it does not require accuracies better than those claimed for the Soviets now.

The result of the second wave of 15 warheads at 5 aim-points is also illustrated in Figure 4. After this wave about 84 silos are destroyed, and the remaining 16 are under at least 14 feet of ejecta, and most are under about 30 feet of ejecta. As can be seen from Figure 4, this attack is designed so that certain rows are "skipped" and buried. This means that if the Soviet r.v.'s overshoot or undershoot their targets, they merely destroy silos that were skipped and bury different silos. Therefore, the net result of about 84 silos destroyed and 16 silos buried is not sensitive to the accuracy of Soviet r.v.'s.

In this relatively simple attack, which is available to the Soviets today, they could destroy virtually all of Dense Pack in 2 waves with about 33 warheads. All the Soviets need to be able to do is stop the 28 or so launchable MX missiles from being used between the 2 waves.

This will require the use of the "pin-down" effect: Pin-down is the use of nuclear detonations to prevent an opponent from launching his ICBM's. Because Dense Pack is so compact, and because most of Dense Pack would be destroyed in the first wave, a limited number of Soviet nuclear detonations high in the

atmosphere directly above Dense Pack (perhaps as many as one a minute at an altitude of 100 miles) would create an environment that would prevent the MX missiles from being launched while allowing Soviet warheads to fly in under these detonations.

The ability of the Soviets to pin down Dense Pack is generally not disputed; instead, the most common arguments offered against it are that it would require a large number of Soviet warheads, and that if the Soviets attempted to pin down our ICBM's we could pin down theirs with missiles from our strategic submarines. This argument is technically flawed. The longest the Soviets need wait for a second wave is about 20 minutes for ground bursts. This would mean that the Soviets might only need about 20 pin-down warheads. Moreover, since the time of flight of the missiles is about 30 minutes, the Soviets will have launched this second wave minutes before the first wave hits Dense Pack and many tens of minutes before our submarines could receive and obey an order from the President to pin down all Soviet ICBM fields (at any rate an expensive exercise in terms of number of U.S. warheads expended).

It might be argued that the numerous large ground detonations will put so much dust in the air that the Soviets would not have much confidence that a second wave would survive, even if it were launched 20 minutes later.

This argument is flawed for two reasons. First, the Soviets could use soft-landers in the second wave. Since the soft-landers descend relatively slowly through the atmosphere they minimize the effects of dust and particles on the r.v. Furthermore, the first wave would have destroyed any defenses against soft-landers that Dense Pack might have had.

Second, the Soviets can use a few of their own large warheads to disperse, destroy or blow away the dust. A few 25-megaton warheads air burst (several miles high) near the top of the dust clouds a few minutes after the first wave

would certainly vaporize much of the dust and disperse the rest.

A few 25-megaton warheads detonated a few minutes after the first wave several miles upwind from Dense Pack (where dust would not be a problem), would create winds that would blow away the large dust particles, which could damage the second wave of r.v.'s. One 25-megaton warhead detonated at an altitude of about 18,000 feet, 5 miles upwind of Dense Pack, would create powerful winds over Dense Pack that would last about 10 seconds and reach speeds in excess of 500 miles an hour. Certainly a few such detonations shortly after the first wave would minimize the effects of dust on any second wave arriving about 20 minutes later by blowing the dust away.[26]

The two wave attack seems quite feasible today, and even more feasible with the advent of soft-landers. Of course even the first wave, which destroys 460 MX warheads and buries 260 others using just 18 Soviet warheads, is impressive, especially if thermal effects are considered.

For a 25-megaton ground burst, the superhot fireball is in contact with the ground out to distances of perhaps 8,000 feet or more.[27] The silos within about 6,000 feet of the detonation point will be subjected to temperatures of from 20,000°C to 100,000°C for a time period on the order of seconds.[28] Thus even the 28 silos that were not buried or destroyed by the first wave would experience temperatures so high that their silo covers would probably be weakened or fused. Moreover, the mechanisms that move the silo covers might very well be damaged or destroyed by the tremendous heat of the fireball.

Hence it is possible that no silos would be operational immediately after the first wave, thus decreasing the need for a Soviet pin-down between waves. Furthermore, any silo covers that did remain operational would very likely be structurally weakened so that they would be extremely vulnerable to the second wave.

Therefore, the two wave attack may destroy all of Dense Pack directly, and in any event, it would almost certainly be more damaging to Dense Pack than indicated by the original calculations.

The Soviets have the capability for the first wave today. The second wave, which may require pin-down, and perhaps soft-landers or nuclear dispersal of the dust cloud, is probably available to the Soviets today, and it certainly will be available to them in 5 to 10 years. Thus this two-wave attack represents a fourth way the Soviets could destroy Dense Pack.

It is important to realize that, even if Dense Pack silos were somehow hardened to overpressures greatly in excess of 5000 psi (and even if the sensitive MX missile guidance systems could be protected from ground accelerations well in excess of 300 g's), the results of attacks 2, 3, and 4 would not change much because these attacks involve r.v.'s detonating on or beneath the Earth's surface, and so they bury any silos they do not destroy.

The first scenario is successful even against silos hardened to over 10,000 psi, since incoming r.v.'s targeted at the center of hexagons detonate about 1,800 feet from six neighboring silos, where the overpressure would be 16,000 psi. If silos were used that could withstand the heat, blast, ground accelerations and neutrons from even more powerful blasts, this attack might have to be modified slightly -- the three warheads targeted to each hexagon could be spaced several hundred feet apart in the east to west direction, for instance -- but the overall result of destroying the majority of Dense Pack with a small number of Soviet warheads would not be changed appreciably.

Thus all four attack scenarios are devastating to silos hardened to overpressures greatly in excess of strengths for silos now under consideration by the Department of Defense.

5. Conclusion

Because Dense Pack can be put on about 14 square miles of land, it is politically attractive. Yet, because one of the 25-megaton warheads that can be carried by the Soviet Union's 300 SS-18's can destroy Dense Pack's hardened silos over an area of about 0.8 square miles, Dense Pack is extremely vulnerable to a limited attack. The only special items required on these warheads for a single wave attack are clocks that can detonate them all within one microsecond in order to avoid all the fratricidal effects. This technology is currently available to the Soviets. In addition, the r.v.'s must be timed to arrive over their targets within one second of a pre-determined time (although they could make due with 3 second timing or worse). For the narrow column configuration of Dense Pack, a two-wave attack that does not use clocks is also available to the Soviets and it requires at most only a modest pin-down capability. Given these capabilities, the Soviets can decimate Dense Pack in at least four ways that are available to them today or that will be available to them within the 5 to 10 years it will take to deploy Dense Pack.

1) At the present time, Dense Pack could be ravaged by r.v.'s that detonate within one microsecond while they are anywhere between the ground and 2,000 feet high. As explained earlier, even with 70% reliable missiles, the Soviets could expect to destroy more than 970 MX warheads with just 60 Soviet missiles in one wave.

2) The Soviets could develop soft-landers in the next 5 to 10 years. Soft-landers that could be detonated within one microsecond would avoid time-of-flight uncertainties, and could also destroy Dense Pack in a single wave following a few precursor high altitude shots.

3) In the next 5 to 10 years, the Soviets could develop Earth Penetrator Weapons that could destroy Dense Pack, even if their yield were only 15 megatons. The EPW's would only require clocks that could detonate all the warheads within

one millisecond, and like the soft-landers, they would also eliminate time-of-flight uncertainties.

4) In the case of the narrow column configuration, the Soviets could use a two-wave south-to-north ground-bursting walk attack that avoids both time-of-flight uncertainties and clocks. This attack may very well require pin-down for 30 minutes (considered feasible by the Department of Defense), and it may require a means of minimizing the resident time of dust in the air such as nuclear dispersal of the dust cloud.

The vulnerability of Dense Pack stems from three factors. First, all fratricide effects can be bypassed with appropriate timing mechanisms. Second, Dense Pack's compactness makes it vulnerable to relatively inaccurate missiles -- so much so that inaccurate missiles will rarely destroy fewer silos than intended and may even destroy more. Third, the small number of Soviet warheads needed to eradicate Dense Pack makes it easier for the Soviets to orchestrate a reliable and well-timed attack. None of the attacks postulated requires more than 100 warheads.

The basic attacks of the 60 25-megaton warheads aimed against 20 aim-points in one wave, and 33 25-megaton warheads aimed against 11 aim-points in two waves, are technically feasible for the Soviets today. Soft-landers and EPW's can probably be prepared within a 5 year period, and they can certainly be prepared no later than 1990. Therefore, by the time Dense Pack is deployed it will be assuredly vulnerable to Soviet attack.

Finally, the compactness of the Dense Pack basing mode creates a serious problem of crisis stability: The MX missiles in Dense Pack could be pinned down pre-emptively by megaton-sized weapons exploding over the 100 silos every minute or so. Two detonations equally spaced along the 14 mile length of Dense Pack can create enough overpressure, dynamic pressure and winds to prevent launching of the missiles. In all,60 submarine launched warheads

can pin Dense Pack for the time it takes Soviet heavy ICBM warheads to arrive over the MX field and destroy it. Therefore, because of its dense configuration, it is possible for the Soviets to prevent the launching of MX missiles from under a Soviet counterforce attack. Since this fact will be a consideration for the President of the United States during a crisis, it is logical to expect that the President will have no other rational option but to launch the MX pre-emptively. On the other hand, since this rationale must constitute part of the Kremlin's calculus of strategic planning, it is also obvious that the Soviets have a clear incentive to pre-empt a U.S. launch of the MX missiles by attacking them first. We are led then to the unavoidable conclusion that, unlike the Minuteman force that cannot be pinned down pre-emptively, the MX missiles in Dense Pack constitute prima facie the source of a profound crisis instability.

## Appendix I

In order to test the sensitivity of the outcome of the first attack scenario to the performance parameters of Soviet ICBM's, we performed a Monte Carlo calculation of the outcome of an attack on the current Dense Pack configuration by 60 Soviet warheads targeted three-each on 20 target points in Dense Pack. The parameters of what will be referred to henceforth as "the basic attack" were:

$N$ = 3 r.v.'s 25 megatons per 7 silo hexagons

$\rho$ = 70% reliable r.v.'s

$r_k$ = 2600 feet kill radius of an r.v. against a silo

$\epsilon_R$ = 950 feet down-range normal distribution error

$\epsilon_T$ = 480 feet cross-range normal distribution error

$r_f$ = 200 feet maximum distance that the prompt fratricide effects could reach in one microsecond.

Table I.

| Change | Average number of silos destroyed | Standard Deviation | Average number of r.v.'s destroyed by fratricide |
|---|---|---|---|
| "Basic attack" | 97.9 | 2.1 | .8 |
| $\epsilon_T$ = 800 feet | 96.7 | 2.3 | .5 |
| $\epsilon_R$ = 1900 feet | 96.3 | 2.9 | .9 |
| $r_k$ = 2100 feet | 89.5 | 3.7 | .8 |
| N = 2 | 92.6 | 4.5 | .3 |
| N = 1 | 73.8 | 9.1 | .02 |
| $\rho$ = .6 | 95.4 | 3.4 | .5 |
| $\rho$ = .5 | 91.2 | 5.0 | .5 |
| $\rho$ = .3 | 73.6 | 8.7 | .1 |
| $r_f$ = 1000 feet | 96.8 | 2.7 | 12.3 |
| $\epsilon_T$ = 800 feet, $\epsilon_R$ = 1900 feet | 95.1 | 3.0 | .5 |
| Intersilo distance = 2000 feet | 95.8 | 2.9 | .66 |
| Intersilo distance = 2600 feet | 80.4 | 4.3 | .66 |

Table I.

Results of basic attack (row 1) and changes in the outcome of the attack as the value of one of the attack parameters was varied. The perturbed parameter is listed in the column labeled "change". At least 100 runs were performed in each case.

Table II presents some results of the Monte Carlo calculation, the "basic attack" in which the radius of prompt fratricide $r_f$ has been extended to 1000 feet for the first microsecond to test the possible effects of radiation that travels at the speed of light. Perturbed parameters are listed in the column labeled "change".

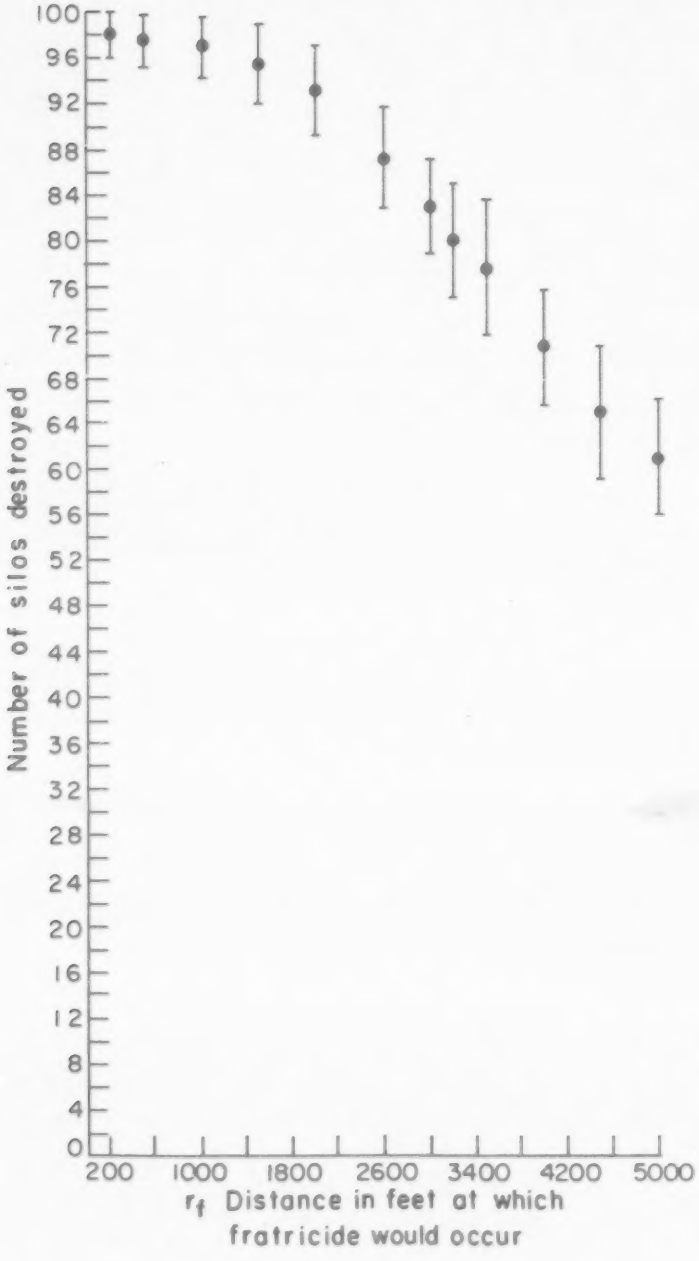
Table II.

| Change | Average number of silos destroyed | Standard Deviation | Average number of r.v.'s destroyed by fratricide |
|---|---|---|---|
| Basic Attack | | | |
| $r_f$ = 1000 feet | 96.8 | 2.7 | 12.3 |
| $\epsilon_T$ = 800 feet | 96.3 | 2.2 | 9.1 |
| $\epsilon_R$ = 1900 feet | 95.4 | 3.5 | 12.4 |
| $r_k$ = 2100 feet | 87.0 | 4.5 | 12.1 |
| N = 2 | 90.8 | 4.7 | 4.9 |
| N = 1 | 73.9 | 8.6 | .4 |
| $\rho$ = .5 | 90.4 | 6.5 | 6.9 |
| $\epsilon_R$ = 1900 feet, $\epsilon_T$ = 800 feet | 94.6 | 3.3 | 9.3 |

At least 100 runs were performed using the computer program attached. The results are given in the first row of Table I. In order to test the sensitivity of these results under varying degrees of Soviet missile accuracy, reliability, multiplicity of warheads and range of prompt fratricide effects, we varied each one of those parameters keeping all the rest fixed. The results as shown in Tables I and II indicate that the effectiveness of the basic attack remains essentially unimpaired until only one warhead is assigned per target. We have also examined the effects of extended prompt fratricide as a measure of how sensitive the one microsecond requirement is for simultaneous explosion of the arriving r.v.'s. The results are shown in fig. A1. Degradation begins at about 2000 feet which for neutrons that are the prime fratricide mechanism is equivalent to a 15 microsecond time delay. Even though the bulk of neutrons will arrive 10-100 times later, about one percent of the total neutron flux will be 2000 feet away at about 15-20 microseconds after the detonation of a warhead. These will flood the plutonium triggers of r.v.'s within that distance and even though they will not damage the trigger, they will most probably cause the weapon to "fizzle" if detonation is intiated during that time.

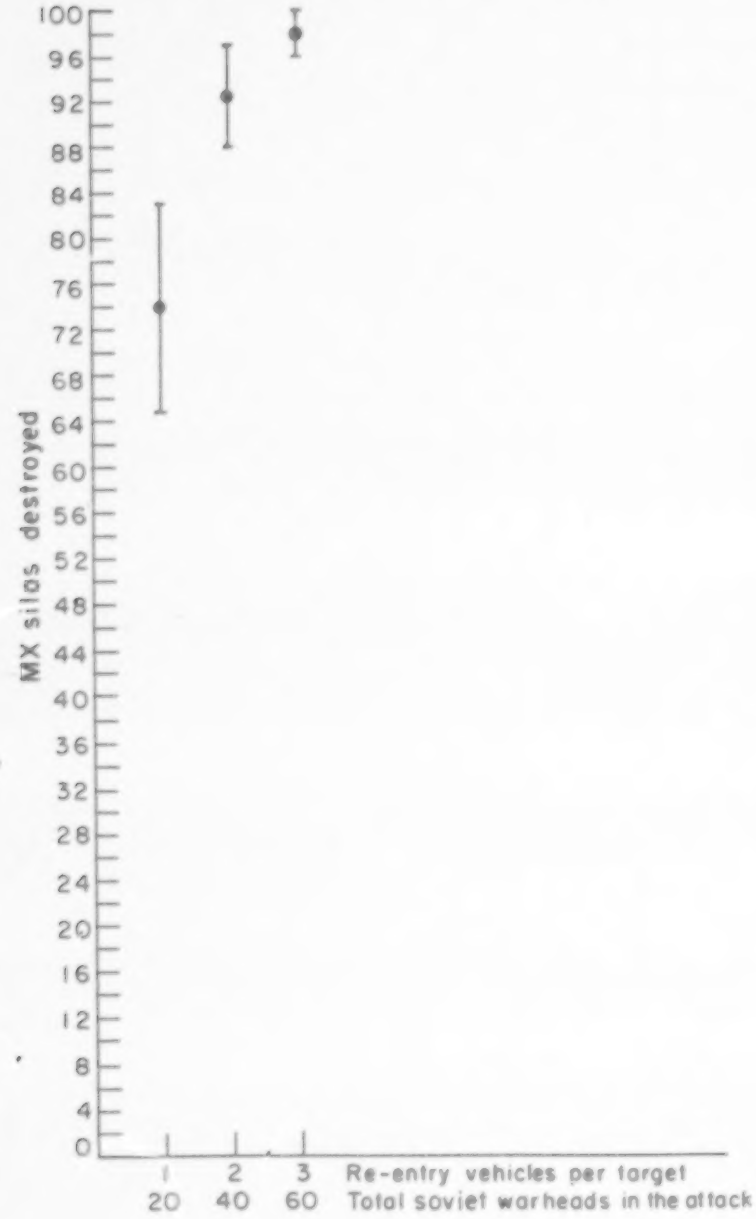
The results of this sensitivity analysis suggest that the 60 warhead attack that triple targets (N=3) each target point is excessively conservative since with N=2 the number of silos destroyed remains over 90. Increasing the track and range errors $\epsilon_T$ and $\epsilon_R$ to 800 and 1900 feet respectively does not materially alter the results of an attack that uses 2 warheads per target (with $\epsilon_T$ = 800 feet, $\epsilon_R$ = 1900 feet, $r_f$ = 1000 feet and N=2 the number of silos expected to be destroyed is 89.7 $\pm$ 4.9 compared to 90.8 $\pm$ 4.7 for the more stringent accuracy requirements.)

Graph A. I Sensitivity of the out come of the "basic attack" to fratricide radius $r_f$ (see appendix).



Graph A.2 Sensitivity of the outcome of the "basic attack" to soviet missile reliability.

Graph A. 3 Sensitivity of out come of the "basic attack" to redundancy of soviet warheads per target.



We have also tested the effects of varying $\varepsilon_T$ and $\varepsilon_R$ on the effectiveness of fratricide. We find that the influence of prompt fratricide on the results of the attack is very insensitive to variations in $\varepsilon_R$ and $\varepsilon_T$ for values of $r_f$ all the way from 200 feet to 3500 feet.

```
;;; -*- LISP -*-
;   DP  -  Dense Pack Scenario Program
;   Copyright (c) 1982 by Kosta Tsipis and Joseph Romm.
;   Written 11/20/82 by Fred Helenius.

;;; Declarations and initializations.
(declare (special nhexagons nsilos nmissiles silo-spacing wins tries
                  missiles-each kill-radius sigma-x sigma-y frat-distance
                  number-of-runs report-subtotals report-progress
                  failed-count failed-subcount kill-radius-squared
                  frat-distance-squared vertical-silo-spacing
                  fratricided-count fratricided-subcount
                  hit-count hit-subcount missile-status missile-x missile-y
                  missile-real-x missile-real-y silo-hit silo-x silo-y
                  count-list))

(setq ibase 10. base 10.                    ; Base 10 for everything.
      gc-overflow '(lambda (nil) t))        ; Get more space as needed.

(*nopoint t)    ; Don't print decimal points after integers.

;Initialize random numbers by time of day.
(sstatus ranoom (apply #'* (mapcar #'1+ (status daytime))))

;;; Useful macros.
; Make arrays look like functions.
(defun silo-hit macro (form)
  `(arraycall fixnum silo-hit ,@(cdr form)))

(defun silo-x macro (form)
  `(arraycall flonum silo-x ,@(cdr form)))

(defun silo-y macro (form)
  `(arraycall flonum silo-y ,@(cdr form)))

(defun missile-status macro (form)
  `(arraycall fixnum missile-status ,@(cdr form)))

(defun missile-x macro (form)
  `(arraycall flonum missile-x ,@(cdr form)))

(defun missile-y macro (form)
  `(arraycall flonum missile-y ,@(cdr form)))

(defun missile-real-x macro (form)
  `(arraycall flonum missile-real-x ,@(cdr form)))

(defun missile-real-y macro (form)
  `(arraycall flonum missile-real-y ,@(cdr form)))


(defmacro increment (var)
  `(setq ,var (1+ ,var)))

(defmacro dotimes (n . body)
  (let ((sym (gensym)))
    `(do ,sym ,n (1- ,sym) (= ,sym 0)
         ,@body)))

;;; Top-level program.

(defun dp ()
  (intro)
  (do () (())
    (input-array-parameters)
    (do () (())
      (input-missile-parameters)
      (if report-progress
          (princ "
Running..."))
      (reset-totals)
      (dotimes number-of-runs
```

```
        (reset-subtotals)
        (reset-arrays)
        (do-missile-reliability)
        (do-missile-arrival)
        (do-fratricide)
        (destroy-silos)
        (report-and-add-subtotals))
      (report-totals)
      (if (not (query-repeat-same-arrays))
          (return nil)))
    (if (not (query-repeat-new-arrays))
        (return nil))))

(defun input-array-parameters ()
  (cursorpos 'c)
  (input-silo-hexagons)
  (input-missiles-per-hexagon)
  (input-silo-spacing)
  (princ "
Creating arrays...")
  (create-arrays))

(defun input-missile-parameters ()
  (input-reliability)
  (input-kill-radius)
  (input-sigma-x)
  (input-sigma-y)
  (input-frat-distance)
  (query-report-progress)
  (if (> (input-number-of-runs) 1)
      (query-report-subtotals)))

(defun reset-totals ()
  (setq failed-count 0)
  (setq fratricided-count 0)
  (setq hit-count 0)
  (setq count-list nil))

(defun reset-subtotals ()
  (setq failed-subcount 0)
  (setq fratricided-subcount 0)
  (setq hit-subcount 0))

(defun reset-arrays ()
  (do ((n 0 (1+ n)))
      ((= n nsilos))
    (store (silo-hit n) 0))
  (do ((n 0 (1+ n)))
      ((= n nmissiles))
    (store (missile-status n) 0)))

(defun do-missile-reliability ()
  (if report-progress
      (princ "
reliability..."))
  (do ((n 0 (1+ n)))
      ((= n nmissiles))
    (if (not (< (random tries) wins))
        (progn
         (store (missile-status n) -1)
         (increment failed-subcount)))))

(defun do-missile-arrival ()
  (if report-progress
      (princ "accuracy..."))
  (do ((n 0 (1+ n)))
      ((= n nmissiles))
    (if (not (< (missile-status n) 0))
        (progn
         (store (missile-real-x n)
                (+$ (missile-x n)
                    (*$ (normal-deviate) sigma-x)))
```

```
        (store (missile-real-y n)
               (+$ (missile-y n)
                   (*$ (normal-deviate) sigma-y)))))))

(defun do-fratricide ()
  (if report-progress (princ "fratricide..."))
  (do ((missile-list (shuffle (iota nmissiles))
                     (cdr missile-list)))
      ((null missile-list))
    (let ((n (car missile-list)))
      (if (not (< (missile-status n) 0))
          (kill-neighbors (missile-real-x n) (missile-real-y n)
                          (cdr missile-list))))))

(defun iota (n)
  (do ((nums nil (cons i nums))
       (i 0 (1+ i)))
      ((= i n) nums)))

(defun shuffle (list)
  (sort list (function (lambda (ni: nil) (= (random 2) 0)))))

(defun kill-neighbors (x y remaining-missiles)
  (do ((missiles remaining-missiles (cdr missiles)))
      ((null missiles))
    (let ((n (car missiles)))
      (if (and (not (< (missile-status n) 0))
               (< (+$ (square (-$ x (missile-real-x n)))
                      (square (-$ y (missile-real-y n))))
                  frat-distance-squared))
          (progn (store (missile-status n) -2)
                 (increment fratricided-subcount))))))

(defun destroy-silos ()
  (if report-progress (princ "silos destroyed"))
  (do ((n 0 (1+ n)))
      ((= n nmissiles))
    (if (not (< (missile-status n) 0))
        (kill-silos (first-silo (-$ (missile-real-y n) kill-radius))
                    (last-silo (+$ (missile-real-y n) kill-radius))
                    (missile-real-x n)
                    (missile-real-y n)))))

(defun first-silo (y)
  (max 0
       (* 5 (fix (//$ y vertical-silo-spacing)))))

(defun last-silo (y)
  (min (1- nsilos)
       (* 5 (1+ (fix (//$ y vertical-silo-spacing))))))

(defun kill-silos (first last x y)
  (do ((n first (1+ n)))
      ((> n last))
    (if (and (= (silo-hit n) 0)
             (< (+$ (square (-$ (silo-x n) x))
                    (square (-$ (silo-y n) y)))
                kill-radius-squared))
        (progn
         (increment hit-subcount)
         (store (silo-hit n) 1)))))

(defun square (x) (*$ x x))

(defun normal-deviate ()
  (let ((x (floating-random)))
    (if (< x 0.5)
        (normal-deviate-util x)
        (-$ (normal-deviate-util (-$ 1.0 x))))))

(defun normal-deviate-util (x)
  (let ((y (sqrt (*$ -2.0 (log x)))))
```

```
    (-$ y
        (//$ (+$ 2.515517
                 (*$ y (+$ 0.802853
                           (*$ y 0.010328))))
             (+$ 1.0
                 (*$ y (+$ 1.432788
                           (*$ y (+$ 0.189269
                                     (*$ y 0.001308)))))))))))

(defun floating-random ()
  (//$ (float (random 1000000000.)) 1000000000.0))

(defun report-and-add-subtotals ()
  (setq failed-count (+ failed-count failed-subcount))
  (setq fratricided-count (+ fratricided-count fratricided-subcount))
  (setq hit-count (+ hit-count hit-subcount))
  (push hit-subcount count-list)
  (if report-subtotals
      (progn
       (princ "
Missiles failed: ") (princ failed-subcount)
       (princ "
Missiles killed by fraticide: ") (princ fratricided-subcount)
       (princ "
Silos destroyed: ") (princ hit-subcount))))

(defun report-totals ()
  (terpri)
  (princ "
Average missiles failed: ")
  (princ (//$ (float failed-count)
              (float number-of-runs)))
  (princ "
Average missiles killed by fraticide: ")
  (princ (//$ (float fratricided-count)
              (float number-of-runs)))
  (princ "
Average silos destroyed: ")
  (let ((mean (//$ (float hit-count)
                   (float number-of-runs))))
    (princ mean)
    (princ "
Standard deviation of number of silos destroyed: ")
    (princ (standard-deviation count-list mean number-of-runs))
    (terpri)))

(defun standard-deviation (numbers mean n)
  (do ((nums numbers (cdr nums))
       (sum 0.0 (+$ sum (square (-$ mean (float (car nums))))))
      ((null nums) (sqrt (//$ sum (float (1- n)))))))

(defun query-repeat-same-arrays ()
  (princ "
Do you want to follow a scenario with the same number of silos and missiles?
(Type Y or N): ")
  (clear-input tyi)
  (member (tyi tyi) '(#/Y #/y)))

(defun query-repeat-new-arrays ()
  (princ "
Do you want to enter a new scenario? (Type Y or N): ")
  (clear-input tyi)
  (member (tyi tyi) '(#/Y #/y)))

(defun create-arrays ()
  (setq nsilos (* 5 nhexagons))
  (setq nmissiles (* nhexagons missiles-each))
  (setq silo-x (array nil flonum nsilos))
  (initialize-silo-x nhexagons silo-spacing)
  (setq silo-y (array nil flonum nsilos))
  (initialize-silo-y nhexagons vertical-silo-spacing)
  (setq silo-hit (array nil fixnum nsilos))
```

```
  (setq missile-x (array nil flonum nmissiles))
  (initialize-missile-x nmissiles)
  (setq missile-y (array nil flonum nmissiles))
  (initialize-missile-y nhexagons missiles-each vertical-silo-spacing)
  (setq missile-real-x (array nil flonum nmissiles))
  (setq missile-real-y (array nil flonum nmissiles))
  (setq missile-status (array nil fixnum nmissiles)))

(defun initialize-silo-x (nhexagons silo-spacing)
  (do ((i 0 (1+ i))
       (n 0 (+ n 5)))
      ((= i nhexagons))
    (store (silo-x n) (-$ silo-spacing))
    (store (silo-x (+ n 1)) 0.0)
    (store (silo-x (+ n 2)) silo-spacing)
    (store (silo-x (+ n 3)) (//$ silo-spacing -2.0))
    (store (silo-x (+ n 4)) (//$ silo-spacing 2.0))))

(defun initialize-silo-y (nhexagons vert-spacing)
  (do ((i 0 (1+ i))
       (n 0 (+ n 5))
       (y 0.0 (+$ y vert-spacing)))
      ((= i nhexagons))
    (store (silo-y n) y)
    (store (silo-y (+ n 1)) y)
    (store (silo-y (+ n 2)) y)
    (store (silo-y (+ n 3)) (+$ y (//$ vert-spacing 2.0)))
    (store (silo-y (+ n 4)) (+$ y (//$ vert-spacing 2.0)))))

(defun initialize-missile-x (nmissiles)
  (do ((n 0 (1+ n)))
      ((= n nmissiles))
    (store (missile-x n) 0.0)))

(defun initialize-missile-y (nhexagons missiles-each vert-spacing)
  (do ((i 0 (1+ i))
       (n 0 (+ n missiles-each))
       (y 0.0 (+$ y vert-spacing)))
      ((= i nhexagons))
    (do ((j 0 (1+ j)))
        ((= j missiles-each))
      (store (missile-y (+ n j)) y))))

(defun input-silo-hexagons ()
  (princ "
Input number of silo hexagons")
  (setq nhexagons (special-read 'nhexagons)))

(defun input-missiles-per-hexagon ()
  (princ "
Input number of missiles targeted for each hexagon")
  (setq missiles-each (special-read 'missiles-each)))

(defun input-silo-spacing ()
  (princ "
Input the distance between adjacent silos")
  (setq silo-spacing (float (special-read 'silo-spacing)))
  (setq vertical-silo-spacing (*$ (sqrt 3) silo-spacing)))

(defun input-reliability ()
  (princ "
Input missile reliability in the form /"Successes out of attempts/"
(successes)")
  (setq wins (special-read 'wins))
  (princ " out of (attempts)")
  (setq tries (special-read 'tries)))

(defun input-kill-radius ()
  (princ "
Input missile kill radius")
  (setq kill-radius (float (special-read 'kill-radius)))
  (setq kill-radius-squared (*$ kill-radius kill-radius)))
```

```
(defun input-sigma-x ()
  (princ "
Input missile standard deviation in direction
ACROSS silo array")
  (setq sigma-x (float (special-read 'sigma-x))))

(defun input-sigma-y ()
  (princ "
Input missile standard deviation in direction
ALONG silo array")
  (setq sigma-y (float (special-read 'sigma-y))))

(defun input-frat-distance ()
  (princ "
Input maximum missile fratricide distance")
  (setq frat-distance (float (special-read 'frat-distance)))
  (setq frat-distance-squared (*$ frat-distance frat-distance)))

(defun input-number-of-runs ()
  (princ "
Input number of times to run this scenario")
  (setq number-of-runs (special-read 'number-of-runs)))

(defun query-report-subtotals ()
  (princ "
Do you want to see the subtotals for each run? (Type Y or N): ")
  (clear-input tyi)
  (setq report-subtotals (member (tyi tyi) '(#/y #/Y))))

(defun query-report-progress ()
  (princ "
Do you want see the progress of each run?  (Type Y or N): ")
  (clear-input tyi)
  (setq report-progress (member (tyi tyi) '(#/y #/Y))))

(defun special-read (var)
  (princ " (")
  (if (boundp var)
      (princ (eval var)))
  (princ "): ")
  (clear-input tyi)
  (if (= (tyipeek) 32.)
      (progn (clear-input tyi) (eval var))
      (read)))

(defun intro ()
  (cursorpos 'c)
  (princ "Welcome to Dense Pack Version 1B.1")
  (terpri)
  (princ "
Enter numeric inputs by following them with a space.")
  (princ "
If you want to use the default value (printed in parentheses), just
type a space.")
  (princ "
Inputs prompted for by (Type Y or N) can be answered with only the letter.")
  (terpri)
  (princ "
Good luck!   (type any character when ready to begin)")
  (tyi tyi))
```

FOOTNOTES

1. Electromagnetic radiation - $\gamma$ rays, x-rays and light of various frequencies travel at the speed of light c, i.e. 1000 feet per microsecond. Nuclear radiation from an exploding nuclear weapon consists of neutrons of varying energies. The fastest ones, with about 15 Mev kinetic energy travel at about c/5 or 200 feet per microsecond.

2. The exact fraction depends on the yield of the weapon, the distance from the detonation, and the time after it. See fig. 8.47, p. 341 of Glasstone and Dolan, "The Effects of Nuclear Weapons", 1977 - henceforth referred to as Glasstone - for the fraction of $\gamma$-rays emitted promptly in the case of large yield weapons.

3. Glasstone, p. 40.

4. K. Tsipis, "Nuclear Explosion Effects on Missile Silos", CIS Report, p. 14.

5. The probability that a neutron entering a mass of plutonium M will fission a plutonium nucleus is $\sigma \cdot 6 \cdot 10^{23}$ M/240 where $\sigma$ is the fission cross-section equal to $10^{-23}$ $cm^2$ for neutrons of the relevant energies. Therefore, the number of fissions a flux of neutrons F is going to cause in that mass is

$$F \cdot M \cdot (6 \cdot 10^{23}/240) \cdot 10^{-23}$$

Since each fission releases about 240 Mev and an Mev is $1.6 \cdot 10^{-6}$ ergs, the total energy released would be

$$F \cdot M \cdot (6 \cdot 10^{23} \cdot /240) \cdot 10^{-23} \cdot 1.6 \cdot 10^{-6} \cdot 240 \text{ ergs}$$

so the energy density in ergs per gram will be:

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$$F \cdot M \cdot 9.6 \cdot 10^{-6} / M.$$

$$\sim F \cdot 10^{-5} \text{ ergs/gr.}$$

This energy goes either in the energy of the material or the radiation energy so

$$F \cdot 10^{-5} = T \cdot C_v + 10^{-15} \cdot T^4/\rho$$

for $T < 10^7$ the second term is negligible so

$$F \cdot 10^{-5} = T \cdot C_v$$

for plutonium $C_v = 6.2 \cdot 10^7$ so $1.6 \cdot 10^{-13} \cdot F = T$

So a neutron flux of $10^{15}$ n/cm$^2$ will heat the plutonium trigger inside an unexploded nuclear warhead to about 100° degrees and most probably incapacitate it. Since the plutonium trigger of a modern fission-fusion-fission weapon is surrounded by about one neutron mean free path of $U_{238}^{92}$ that will reduce the neutron flux outside the warhead by about an order of magnitude, it will take $10^{17}$ n/cm$^2$ to incapacitate the incoming r.v. assuredly.

6. Brode: "Nuclear Weapon Effects" in the Annual Review of Nuclear Science, 1968, Vol.18, p.176. Henceforth referred to as Brode.

7. Glasstone, pp. 66, 70-71.

8. For overpressures $P_o$ above 100 psi a very good approximate relationship between $P_o$, the yield of the weapon Y and the distance from the point of detonation R is given by

$$P_o = \frac{16.4 \cdot Y}{R^3}$$

where $P_o$ is in psi, Y in megatons and R in nautical miles. For example, 1800 ft. away from a 25-megaton explosion, the overpressure will be

$P_O = \frac{16.4 \cdot 25}{(1800/6080)^3}$ or 15,800 psi. For greater accuracy, rather than use this convenient approximation, all data on blast strength are derived from Glasstone pp. 111-113 figures 3.73 a.b.and c. using the usual $Y^{1/3}$ scaling law. Dynamic overpressure figures are taken from Glasstone figure 3.76 and the relationships between peak overpressures and wind velocities from Glasstone p. 82. Arrival times of shockwaves after one second are derived using the same scaling law from Glasstone fig. 3.77 a & b on p. 121. For times of arrival earlier than one second we have used the formula

$$\tau_a = 2.2 \cdot R^{5/2} / Y^{1/2} \text{ which is good for } Y/R^3 >> 1.$$

$$\tau_a = \int_o^{R_a} \frac{dR}{U}$$

where $U = C_O(1 + \frac{6P}{7P_O})^{1/2}$ and $P = \frac{16.4Y}{R^3}$

$C_O$ is the speed of sound and $P_O$ the atmospheric pressure i.e. 14.7 psi.

9. The arrival times for neutrons are given for the fastest neutrons which comprise only about $10^{-3}$ of the total neutron flux. The majority of neutrons travel 10 to 100 times slower, so for incoming warheads 1000-2000 feet away from a detonation, fratricide will not begin until 100-500 microseconds after the initial detonation. Thus for practical purposes synchrony of detonation within half a millisecond would probably still avoid fratricide.

10. These figures are derived using the $Y^{1/3}$ scaling law from Glasstone figures on p. 9 and 36.

11. Glasstone, pp. 506-507.

12. All calculations of ground acceleration and displacement are based on formulas given in Brode p. 190.

13. Glasstone p. 255 and 256 fig. 672 a and b.

14. All ejecta figures in this report are calculated on the basis of formula 6.75.1 of Glasstone p. 256, and material in section 6.71, p. 253.

15. Another possible attack scenario for the Soviets would be to expend 550 (one per silo) or 1100 (two per silo) of their warheads to destroy the 1650 U.S. warheads carried by the 550 MM III missiles, a more advantageous exchange ratio for the attacker. This advantage is rapidly eroded, however, if reliability and bias errors are factored into any attack calculations.

16. This figure is based on a re-entry angle of 27° and a $\beta$ = 1500.

17. This is the best CEP Soviet missiles have been credited with. (James Miller, Head, DIA Weapons and Systems Division, in hearings before the Senate Appropriation Committee, 1981). The SS-18 Mod I that has been tested with one 20-25 megaton warhead has a CEP larger than this. It can be safely expected, however, that the Soviets could endow SS-18 with single warheads with this CEP in the time it will take to deploy Dense Pack. Track (or cross range) error is computed here using (a) the formula for CEP given by Bruce Bennett, "How to Access the Survivability of U.S. ICBM", appendices p. 20. According to this formula CEP = $(.5887)(\varepsilon_R+\varepsilon_T)$ where $\varepsilon_R$ and $\varepsilon_T$ are the down-range and cross range error respectively. (b) D. Hoag's analysis in "Ballistic Missile Guidance" from the book Impact of New Technologies on the Arms Race, by Feld, Greenwood, Rathjens

and Weinberg, is consistent with the assumption that $\epsilon_R = 2 \cdot \epsilon_T$. Therefore B50 ft. = $.59 \cdot 3 \cdot \epsilon_R$ = 480 feet. Given this value for $\epsilon_T$ it is easy to calculate (assuming a normal distribution both in down- and cross-range) that 90% of Soviet r.v.'s will come within $\pm$ 800 feet cross-range of their intended targets. A 30% improvement in CEP will raise this figure to 99% within $\pm$ 800 feet. It is unlikely then that cross-range error is going to be significant in the final outcome of a Soviet attack against Dense Pack.

The Monte Carlo calculations that we have performed (see Appendix I) supports this expectation. Increasing $\epsilon_T$ from 480 feet to 800 feet (a 67% increase) resulted in only a 1% decrease in the number of silos destroyed (from 97 to 96).

18. It is assumed here that a normal spatial distribution about the target is reflected in a normal distribution in the timing of arrival of the warheads. This is true only in certain types of guidance and fusing of the re-entry vehicle. In these cases, the Monte Carlo calculation shows (see Appendix) that even when the time of arrival is spread over 2 seconds the percentage of silos destroyed is reduced from 96.7 $\pm$ 2.3 to 95.1 $\pm$ 3.0. We believe that this assumption is a valid one because in an attack against Dense Pack the Soviets would use time-of-flight fusing and would select the guidance principle of their missiles accordingly. There are reports that the 1978-79 series of Soviet ICBM tests showed the Soviets were capable of such timing accuracies.

19. The results of the Monte Carlo calculation demonstrate that the number of silos destroyed in the attack is insensitive to early fratricide effects. Assuming a neutron fratricide radius of 200 feet (the distance the fast

neutrons could travel in one microsecond) on the average of the 42 working r.v.'s (60 r.v.'s with 70% reliability leave 42 functioning ones arriving over Dense Pack) only one is destroyed by prompt fratricide. When the fratricide radius is increased to 1000 feet for the first microsecond (i.e. assuming that the damage was done by something traveling at the speed of light) 12 out of the 42 r.v.'s were destroyed. But the number of silos destroyed was reduced only by 1. This indicates that indeed the r.v.'s destroyed by this prompt fratricide would have destroyed most of the same silos anyway.

20. Assuming a reliability of .7 for the Soviet missiles we have the following probabilities that a target point will receive a given number of warheads.

| # of working warheads at target | Probability | |
|---|---|---|
| 3 | $(.7)^3 =$ | .343 |
| 2 | $3 \cdot (.7)^2 \cdot (.3) =$ | .441 |
| 1 | $3(.7) \cdot (.3)^2 =$ | .189 |
| 0 | $(.3)^3 =$ | .027 |

Then the probability that at least one warhead will arrive at a target is .973=(.343 + .441 + .189). So the probability that all 20 target points will receive at least one warhead is $(.973)^{20} = .58$. So there is a 42% chance that at least one target will not receive a warhead, and a 10% probability that two or more targets won't be attacked.

21. This result is supported by the Monte Carlo simulation: The average result of 200 runs in which the basic attack we describe here was simulated was that 98 $\pm$ 2 silos would be destroyed.

22. See Table II in Appendix. Even when the track error is increased 67% and

the range error is doubled, the results of the simulation indicate that 95 MX silos are expected to be destroyed.

23. The insensitivity of the outcome of the attack as described in this report to the inaccuracy of Soviet r.v.'s is discussed in footnotes 17 and 18. With a timing uncertainty in arrival of 3 seconds - assuming a normal distribution of the times of arrival over Dense Pack - one can expect about half of the warheads to be over their targets. If the Soviets used 80 rather than 60 warheads in such an attack they would insure that on the average 2 warheads would be over each target. The results of the Monte Carlo calculation indicate that at least 93 MX silos would be destroyed in such an attack. In general because of the nature of the target, the Soviets can take anticipatory measures by increasing the redundancy of warheads on each target, that can predictably compensate for inaccuracy, unreliability or errors in timing of the arrival of their warheads.

24. Increasing the distance between silos or increasing their hardness does not materially alter the outcome of the attack. Doubling the hardness to 10,000 psi will reduce the number of destroyed silos by 10%.

25. The first wave consists of four groups of 3 warheads aimed in an 8-kill configuration (32 silos destroyed, 14 buried under 15 feet of ejecta) and two groups of 3 warheads aimed in a 7-kill configuration (14 silos destroyed, 4 buried under 16 feet of ejecta, 8 under 9 feet).

26. Even 1.5 miles away particle velocity would be 2000 ft./sec. and shock front velocity 3000 ft./sec. This velocity persists at over 1000 ft./sec. even more than 7 miles away. Numbers derived from figure 3.55, p. 98 of Glasstone.

27. Glasstone, pp. 70-71.

28. These numbers are derived using the scaling laws from Brode p. 167 fig. 9 and formulae 28 and 29 p. 175.

The CHAIRMAN. And should there be any counterarguments the Department would like to put in, they would be inserted immediately after that.

Secretary WEINBERGER. I assure you, Mr. Chairman, there will be, and I appreciate that.

The CHAIRMAN. Thank you very much, Senator Tsongas.

Senator Dodd?

Senator DODD. Thank you, Mr. Chairman.

I just have a couple of brief questions, Mr. Secretary. I appreciate your being here, and I particularly enjoyed listening to the discussion of Senator Biden and Senator Glenn and yourself. It was helpful to those of us who do not spend as much time on the technicalities involved in these issues. I was told prior to my arrival here that you made a statement as part of your prepared text, I tried to find it there and could not, so it may have been something you said in response to questions regarding MIRV, that the Soviets had taken that technology.

Secretary WEINBERGER. No; it is the accuracy I was referring to, Senator. The accuracy of their reentry vehicles has been essentially attained by technology taken from us, some of it transferred legally, some of it stolen.

Senator DODD. Well, that was my question, really, how they had acquired it. Do you know specifically whether or not it was stolen?

Secretary WEINBERGER. The one item that has helped them the most, and Dr. DeLauer can elaborate on this, was the ability to turn out very small, finely ground ball bearing systems, which they took as part of a contract, and that had as its basis the increase of trade. It did not have the proper scrutiny to demonstrate that it had a high military capability.

Senator DODD. When did that occur?

Secretary WEINBERGER. In 1975, 1976, around in there.

Senator DODD. As I recall, similar requests as early as 1961–1962, to the Commerce Department had stopped ball bearing transfer.

Secretary WEINBERGER. This one got through and caused a great deal of the problems that we have now, and there, obviously, have been other things. I think and I very much hope that in the future we will be far more careful of the technologies we transfer, and without engaging in an economic boycott or a trade war I would hope that we would look very carefully at the potential military use of things that apparently on their face have only a civilian application.

Senator DODD. But that would be the bulk of where the technology came from then. Are there any specific cases of theft?

Secretary WEINBERGER. Oh, yes.

Dr. DELAUER. Senator, not particularly in the ballistic missile area, but for instance they obtained our design of a laser, a ring laser gyro from one of the subsidiaries of an American company in Germany. They of course have done an awful lot of work.

Senator DODD. Through technology transfer or through theft?

Dr. DELAUER. That was through theft, through espionage. They have done some of the things that you are well aware of in other areas of espionage. Our estimate is that the technology transfer is about 50 percent by espionage, 25 percent by loosely controlled commercial transactions, and some just by our inability to control the

destination of a lot of small items that are distributed through a worldwide trade system. That kind of distribution is the estimate of our losses to the Soviets.

Senator DODD. It may have just been a reaction I had in response to questions from Senator Glenn about the present administration position with regard to a basing mode, but it struck me as less than a firm commitment to Dense Pack as a basing mode when you suggested that you had hoped that the Senate would consider that proposal. I almost had the feeling that if we considered something else, that is, if the Congress considered something else, the administration would be willing to consider that. Are there other options?

Secretary WEINBERGER. That is always the trouble with being forthcoming, receptive and conciliatory. The simple fact of the matter is that the President was directed to choose the basing mode of a permanent kind and report it to the Congress by December 1. He made his recommendation of a new basing mode on November 22. The appropriation bill that was going through the Congress at that time provided for the production funds and research and development funds for the MX.

The President has said many times, and I fully agree, that, yes, this is a short time, November 22. It is a complex subject. By all means study it, and we hope you will adopt it. We have not backed away from it. We hope you will adopt it. We are prepared to demonstrate it, to argue it as we are arguing it this morning and can do in much greater detail in this or closed sessions. We believe this is the most endurable, most survivable method, but of course the Congress should have plenty of time to consider it, and we hope that they would adopt it.

Meanwhile, we very much hope that they will not deny the production funds so that these schedules would slip and we would be delayed longer than we should be, longer than we may have time for in deploying this new deterrent capability. That is all that is said. There is not any weakening.

Senator DODD. I did not mean that there was a weakening. It is just that this thing has been studied to death, and there have been, as you know, a number of proposals made as to a basing mode. The linkage between the basing mode and the viability of the missile itself seems inextricable, so you have got to have a basing mode, but what is the fallback position? Is there a secondary position that the Joint Chiefs of Staff or your staff may be suggesting if in fact this system is not approved, whether it is for political reasons or technical reasons?

If there is another basing mode that maybe Congress would find more acceptable, or technical experts would give a greater support, what is it?

Secretary WEINBERGER. We have repeatedly asked for suggestions from people who can point out quite honestly and conscientiously problems with every system that is suggested. We found the problems associated with the MDS system overwhelming. They argued strongly for stopping it, though that involved some delay and a very major shift. We considered it very carefully and had the best advice we could get. We spent about 8 or 9 months examining that problem, finally concluded that we should cancel that, and asked for an opportunity to develop a better plan.

We also recognize the overwhelming importance of getting the MX missile with its capabilities into the ground, and we did ask that on an interim basis, you allow us to put them in Minuteman silos. Congress said no, they did not want to do that, and they wanted the decision by December 1. On November 22 we reported the decision of the President, and we certainly believe and feel very strongly that the Congress should have ample time to debate that. We also hope that there will be no holdup in the production costs.

Now as far as fallback positions or alternate systems are concerned, frankly we do not have any because we spent our time trying to develop a plan we felt we could recommend to the Congress, knowing full well, as I told the President, that there are problems with every single system that has been suggested. There is no perfect system. It is going to be quite easy to point out individual matters of criticism. Every system is subject to criticism, but the overwhelming importance of regaining this deterrent capability by having this missile deployed seems to me to make essential that we try to find the most survivable system, that we try to think ahead as to what the Soviets would do to counter it, and what we would do to meet these counters. That is exactly what we have done. That is why we have confidence in telling the President and in reporting to you that we believe this system can survive well into the next century. If the Soviets take certain counters, which we understand they can do, but which they have not done yet. We will know about it when they start and can in turn respond to it in a manner that gives the system survivability.

Bear in mind the Minuteman system has given us many years of protection. As we said earlier, it does not do that any more.

Senator DODD. I appreciate your comments about being conciliatory and so on—you always are before this committee, but I am left here this morning with the feeling that as a spokesman for the administration, you are far less than committed to Dense Pack as a basing mode. If the Congress rejects that, you really—I don't get the feeling that it is an absolute essential to you at all.

Secretary WEINBERGER. Then I have failed in my presentation, Senator, because we would not know how we are able to deploy this missile which we think is essential to deploy. Bear in mind we have been denied the possibility of putting it in existing silos. We have been told we cannot consider airborne deployment. We believe the MDS system of the previous administration is too vulnerable and plays to the Soviets' strong suit. We have developed the system that we believe is the best. Now I do not see how anyone can say that that could leave you with the impression that we either do not care much what you do with this deployment system——

Senator DODD. I did not say do not care much.

Secretary WEINBERGER. Or that we have all kinds of alternatives. Frankly, we do not. We do feel it is entirely proper for the Congress to spend the time that it needs to examine this proposal. We would very much hope at the conclusion of that examination that you would agree with us that while it certainly has areas that can be criticized and points of vulnerability, it is the most survivable of all the available systems, and so I do not have any hesitancy in endorsing it and supporting it fully.

I do not believe whatever that you should take it on blind trust or judgment. You should have an opportunity to examine it. Given the deadlines and the constraints under which we operated, we were rather pleased with the fact that the President made his report 8 days early, but that still was just a short time ago, and obviously it is a new proposal. Of course, it should be studied, but that is not to say that we are not supporting it strongly, and if that is not sufficient, I will go back to the Department and write the strongest statement I can, given a little more time, and that will be the statement.

Senator DODD. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Dodd.

I have just a few additional questions with respect to the arms control aspect of the Defense Department program. I want to say first that I think your absolutely unequivocal statement, and I have heard you speak strongly before, but never spoken more strongly, that it is the policy of this Government that we have no first-strike intentions of any kind. You have so unequivocally stated that that no one, anyone, the Soviet Union or otherwise, could have any different impression after hearing you, and you spoke with great conviction.

You also did mention that at the heart of our whole strategic defense program is a policy of deterrence, and as long as I have been here and dealt with this program, that has been the policy of every single President and every single Congress. The problem I have with Dense Pack is that if it is flawed in the minds of defense experts, including three of the five Joint Chiefs of Staff and past Secretaries of Defense such as James Schlesinger and Harold Brown, then the question is, is it really a deterrent to the Soviet Union if it is not credible as a deterrent to our own experts here?

Are we then getting value for that kind of investment? If it really is not credible to them, what are we building it for? That is the question that would come to many of our minds.

Secretary WEINBERGER. Senator, if I could comment on that for a moment, the Joint Chiefs certainly did not feel that the plan was flawed or that it was not a credible deterrent. All of them backed the President's decision to deploy it in this way. What they did, which was quite proper, and certainly part of their responsibilities, was to point out, as I was saying to Senator Dodd, that there are some faults, some points of criticism, some ways in which this system is not 100 percent invulnerable. And some said that because no system is completely invulnerable, maybe we should, in effect, give up the ground-based leg of the Triad and go to sea.

We do not believe that is the way to do it. Others said that may be we should put them in existing silos until we can find a better plan, which is what the President said a year ago October, before we had this intensive examination of the various alternatives. The important thing, I think, is not whether somebody can find a flaw here or a flaw there or something that raises some question. The important thing is this: do we or do we not gain a credible deterrent by deploying this missile in the most endurable form that we can find. We believe that the answer to this question is yes and that we should proceed with it.

But we know, and have known all along, without the slightest doubt, that various people can find various things wrong with this

or indeed any system, just as we found quite a lot that we felt was wrong about the MPS system.

The CHAIRMAN. Mr. Secretary, as you know, I have been a strong supporter of the START and INF negotiations, and I believe that the President has been realistic and has shown a degree of flexibility there. The President also strongly supported the Warner-Jackson resolution as it appeared before this committee, which called for the initial reduction of a third and ultimately the destruction of every nuclear weapon, and that is a policy that I strongly support.

Is the administration willing to negotiate on the MX, and if so, what would the Soviets have to give up in order for us to agree not to deploy that missile?

Secretary WEINBERGER. That involves a degree of hypothetical negotiating and I don't think I am the best person to engage in it. What the President wants, with the proposal that he has made in START, is a major reduction both in warheads and in intercontinental land-based missiles, which are the most destabilizing of all to both sides. It would make verifiable reductions that would bring us down to equality on both sides. That would be the first step, as he said when he proposed negotiations in his November talk.

The second stage would be to try to reach vastly lower limits, and in the intermediate range, as you know, he started out with a proposal that would take us back to zero. The administration is fully committed to the whole idea of not just an esoteric formula for arms control but of real reductions. We want to bring it down to equality on both sides. We want it fully verifiable. The sooner we can get these arms agreements, the better.

The CHAIRMAN. I understand that President Reagan has just announced a bipartisan compromise on the MX. Can you give us the details of that?

Secretary WEINBERGER. I assume that he has announced the whole thing that we discussed this morning and yesterday. Generally, what it provides is just what we have been talking about. It provides for the appropriation of the funds for production and research and developing, putting a fence around those funds while there is time for Congress to consider the matter, asking the President to submit a rather detailed analysis of the reasons for his choice of the closed-base basing, and an examination of any alternate methods of basing and alternate missiles, and to submit all of that to the Congress by March 1. Then Congress would vote, I believe, 45 days later on a resolution that would approve the release of the funds in the appropriation bill.

To the best of my knowledge, we were advised this morning that there is substantial support for that kind of compromise, and I would very much hope that it would be one that would be adopted. It would do just what I was talking about to Senator Dodd. It would provide for maintaining the schedules, the appropriation of the funds, and an opportunity for the Congress to examine a proposal that the President made on November 22. It fulfills all of those things and gives what I believe to be ample opportunity for consideration of these extremely important matters. Obviously we support it fully.

The CHAIRMAN. Thank you very much.

Secretary WEINBERGER. I did not know it had been announced, or I would have incorporated its details in my earlier statements.

**The CHAIRMAN. If the MX does not appear to be something that can be traded for whatever we would request the Soviets to give up if we did not go ahead with it, does it have any real value then as a so-called bargaining chip?**

Secretary WEINBERGER. No, I do not think it is a bargaining chip, Senator. I think you have to look at two things. You have to look first of all, at the fact that the President said in effect that everything is negotiable, conventional, and strategic. It demonstrates again as full a commitment to arms reduction as any I have ever heard. It is, however, essential that we regain our strength, otherwise, we will not be able to maintain the deterrent. We also have to bear in mind the fact that the President's proposals conceivably could not be agreed to, and if they are not and we have done nothing to regain that deterrent that comes from the MX and the other things that he has proposed, then I think we have set ourselves seriously back, and substantially endangered our position.

So it is not a bargaining chip. It is an essential recovery of deterrent strength. If some supervening fact comes over in the form of a genuine reduction of arms that could be fully verified, that is something that we want very much to achieve.

The CHAIRMAN. I did over the weekend talk to a great many of the experts in the field who have left other administrations, Republican and Democrat, and I seem to find a consensus that the B–1, Stealth, Trident II, ALCM, and SLCM programs do give us a very strong bargaining position in START, and many of them felt that MX was not necessary, considering the strength of those programs. Would you care to comment on that?

Secretary WEINBERGER. Yes, I would, Senator. I would go back to the portion of my opening statement here, and that is that we do not believe we can give up the Triad, and we certainly do not believe we can give up the ground-based portion of the Triad, the land-based ICBM's. They are flexible. They have quick response. They have reliable real time communications which we would certainly strengthen as part of the Presidents' program. They offer an alert rate approaching 100 percent as compared with the bombers. They can be maintained at low operating cost, and there isn't any other single system that has all those qualities and characteristics.

We have always felt that we needed a degree of redundancy, something that would require the Soviet planners to work on a number of different kinds of systems as counters. If we give up the ground-based system, we simplify their task enormously. We also rely on a bomber, the B–52, that has given us some 25 years of protection, but that we hope will be replaced by the B–1. We rely on a submarine which at the moment is the most protectable and enduring of all parts of the triad but which does not yet have the missile with the accuracy or yield that it needs.

It would also mean the Soviets could concentrate heavily on air defense, or if some who are talking about knocking out the B–1 prevail, they could concentrate only on the submarines. That would leave us in a very dangerous position without an effective deterrent, with all that that would mean for the world's peace.

The CHAIRMAN. Thank you very much, Mr. Secretary.

Senator Pell.

Senator PELL. Thank you, Mr. Chairman.

Mr. Secretary, you are undoubtedly familiar with Presidential Decision Paper 59, the strategic document that the previous administration followed. Has that paper been replaced or is it still in force?

Secretary WEINBERGER. No. We have drawn up a new policy paper that does not change substantially or materially the policy set out in Presidential Decision Paper 59. It refines it a bit. It takes into consideration some of the new and growing Soviet capabilities. But the essential strategic doctrine set out in P.D. 59 remains.

Senator PELL. Basically I am relieved to hear this. We have the same strategic doctrine in broad outline as did the previous administration.

Secretary WEINBERGER. I guess I did not hear the first part of that.

Senator PELL. I am relieved to hear this. But what I understood you to say is that we have basically the same strategic doctrine as the previous administration.

Secretary WEINBERGER. Yes. With your permission I would rather discuss this in detail in the closed portion that we had planned but I can certainly say that essentially the basic strategic doctrine is not changed and of course has not been for a number of years. The thing you have to do to maintain deterrence, however, and change as the Soviet capabilities change.

Senator PELL. Is the administration taking steps envisaging the idea of a protracted nuclear war?

Secretary WEINBERGER. No, sir.

Senator PELL. What is the difference between the idea of no first strike—I was very relieved to hear your response to Senator Biden on that matter—and the fact that in Europe we really depend upon first use as a deterrent.

Secretary WEINBERGER. We depend upon deterrence, and we have always had deterrence of a war as our policy at all levels, conventional and strategic. It is essential that we do have a capability of responding with a degree of retaliatory force that will discourage and deter any first use. That is a basic policy that we have had right along.

You have heard some discussions recently of talks that General Rogers has made in which he suggested that a far greater emphasis on improving conventional capability would reduce the possibilities of use of nuclear weapons. That has been misconstrued in many quarters as announcing some kind of new doctrine. It is not. It is precisely the doctrine that General Rogers and his predecessors have discussed many times for years, literally since NATO began.

Senator PELL. But no matter whether it is called first strike or first use, the fact remains that we do depend upon first use or first mini-strike, if you want to call it that, of nuclear weapons.

Secretary WEINBERGER. Senator, we have a nuclear capability, a theater nuclear capability, which we have had and which the Soviets have had. It is essential to deterrence that we maintain that.

As you know, the President has proposed taking the intermediate nuclear range weapons down to zero on both sides, and this would certainly reduce the possibilities of even thinking about those matters.

Senator PELL. I wonder if you could, going back to the previous question, provide for the record an analysis explaining the nuclear guidance today and in what ways it does differ from the guidance under the previous administration.

[The information referred to follows:]

NUCLEAR POLICY DIFFERENCES

The current nuclear policy guidance generally reaffirms the fundamental principles of previous U.S. nuclear deterrence policy. There are, however, some differences between the current nuclear guidance and the previous administration's guidance. The current guidance:

• Clarifies and emphasizes the direct link between nuclear weapon deterrence strategy and acquisition policy; i.e. our objectives and national security requirements if we fail to deter in a conflict will directly determine our systems acquisition and weapons requirements in peacetime.

—Deterrence strategy should determine basic nuclear weapons requirements, force acquisitions and force structure.

—Deterrence strategy should evolve in parallel with improvements in force capabilities.

• Places greater emphasis on the importance and need for diversity in nuclear weapon systems and basing modes.

—Diversity in force structure strengthens flexibility, survivability and endurance which, in turn, strengthens deterrence.

—Diversity complicates Soviet defense and attack planning.

—Hedges against unforeseen degradation in the effectiveness or survivability of our force elements and the possibility of Soviet technological breakthroughs.

• Recognizes better than previous guidance the importance of command, control and communications for the U.S. deterrence forces and their significant contribution to stable deterrence.

• In addition, the current guidance was prepared as a part of a broader policy review which includes significant strengthening of our conventional deterrent.

Secretary WEINBERGER. Yes, sir, to the extent that we can, we will.

Senator PELL. Thank you.

Now, going to this question of nuclear war, how many Americans would be killed in a full exchange and how many Soviet citizens?

Secretary WEINBERGER. I have not any idea, Senator.

Senator PELL. Has this not been calculated?

Secretary WEINBERGER. There are various calculations that people have reportedly made from time to time, but I do not know of any way of doing this or any kind of acceptable calculation. It is not a calculation we make because it is not a calculation that has relevance to our policy of deterrence. Our policy is to deter war. Our fear is that if we do not regain the strength necessary to maintain deterrence, there might possibly be some statistics that would have some validity. But there are none that we care to contemplate, and there is no acceptable level or anything of that kind at all.

The danger is there if we do not regain the strength we have to have. That is what we keep emphasizing and that is why we think it is so essential that we move forward on regaining the strength at all levels as the President has requested.

Senator PELL. Thinking back to my own attendance at the military war college when I was in the Reserves, I always thought that in any planning we have made we have also made plans for the casualties that could eventuate from carrying out that plan. You say this is not the case in nuclear warfare?

Secretary WEINBERGER. Not that I am familiar with, sir.

Senator PELL. So there is no plan within your Department with which you are familiar that would calculate the losses on both sides in a nuclear exchange?

Secretary WEINBERGER. No. We are not spending time on that. We are spending time trying to regain a degree of deterrent strength that will prevent war, and that is our whole goal, our whole aim, and our whole ambition.

Senator PELL. Would you be willing to advance a personal view as to how many Americans would be killed in a nuclear war?

Secretary WEINBERGER. Would I be willing to what?

Senator PELL. Express a personal view.

Secretary WEINBERGER. No. I do not have a personal view on that matter. I do not have any way of calculating it. I do not think there is any use or profit in trying to make any kind of wild estimates of that sort. All those variables are involved, such as how many missiles they would send, where they would send them, and all the rest. I just think that is a totally fruitless exercise, if you will pardon my saying so.

Senator PELL. It is not a fruitless exercise when it comes to lower levels, because you can go to the Naval War College at Newport or anywhere else; and in any war game they crank into it the probable casualties and possible casualties resulting from it.

Secretary WEINBERGER. Those are games I do not play.

Senator PELL. Given our present strategic forces, do you believe that any Soviet official would advise a nuclear attack on the United States?

Secretary WEINBERGER. I do not know, and it is that uncertainty that leads me to think that it is absolutely essential that we convey to them and to the world our retaliatory capability that would discourage that. I do not know how much time we have to do that. I know that we do not have enough now and that we need to regain the strength called for by the President last October in 1981.

Senator PELL. Let me escalate the level of decision a little more. Can you visualize any circumstances in which the Soviet leadership would order such a strike?

Secretary WEINBERGER. Senator, I cannot indulge in speculation on that type of matter because it is a matter in which I cannot afford to be very wrong. It is something that conceivably could happen. It is something that we do everything to prevent. All of our efforts are designed to prevent their ever getting any kind of impression that they could do that.

The worry is that if we do not take the steps necessary to regain the effectiveness of the deterrent which has protected the world for 37 years now, somebody over there might be tempted. I do not know. I have no idea. I cannot read their minds. All I know is that I cannot afford to be very wrong.

Senator PELL. Thank you very much. My time has expired.

The CHAIRMAN. Thank you, Senator Pell.

Senator Biden.

Senator BIDEN. Mr. Secretary, I understand your great reluctance to say anything that has numbers of casualties in it or to talk about first strike or to use any phrase that may be misinterpreted with a headline in the press or in the evening news. And I do not belittle that concern, but it is for the record. We make wild estimates all the

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time. They are not so wild. We make them all the time. There are volumes of them over in the Pentagon. I have sat in the Intelligence Committee and seen them presented to me, reams of them, so they are there for your information. And I understand your not wanting to say it, and I think they should be there, No. 1.

No. 2, it is the administration's policy, strongly held, that a renunciation of first strike on the theater would be a drastic mistake for the United States to make. Another way of saying it is, it is the policy of this administration; it is the policy of the last administration; it has been the policy of every administration that in the theater, the first use of nuclear weapons in the theater is an option that is available and one which the Soviets would have to know we would, in fact, possibly use in order to be a deterrent.

So just for the record, so no one else misunderstands, that is our policy, and I understand your not wanting to say it because of your reluctance to see a headline saying Weinberger says first strike U.S. policy. And I can do that without even being on the Pentagon payroll. [Laughter.]

Secretary WEINBERGER. I was going to suggest, Senator, that there are certain preliminaries necessary before you are able to speak for the administration. [Laughter.]

Senator BIDEN. Well, why do you not discount everything I said? Is anything I said wrong?

Secretary WEINBERGER. Senator, I am not going to be led into all of those very elaborate trips to discuss these matters because I have stated our position.

Senator BIDEN. All you Republicans think in terms of traps and dodges. You sound like Secretary Haig. [Laughter.]

Secretary WEINBERGER. That is based on bitter experience, Senator. [Laughter.]

Senator BIDEN. I can understand that.

Well, at any rate, what I would like to explore in the few minutes I have is the military requirement for the MX.

Now, if 100 were deployed and all survived the first strike, a first strike by the Soviets, we would have 1,000 surviving hard target warheads.

Secretary WEINBERGER. Right.

Senator BIDEN. Now, let me stipulate that a Soviet first strike might destroy or knock out of commission up to 20 percent in a Dense Pack mode. We would have 800 hard target warheads remaining.

Now, is that the military requirement that we are seeking to fulfill by the MX?

Secretary WEINBERGER. Senator, you are really in an area that requires classified answers. I am not able to give them in open session. I would simply say that we are satisfied that the degree of survivability which we believe we would achieve with the closely spaced basing would enable us to maintain an effective deterrent with the ground-based leg of the Triad.

Senator BIDEN. I think that is a sufficient answer, and I appreciate that, but let me explore the concept a little further.

You are satisfied that a Dense Pack basing mode, whether it is all 1,000 hard target warheads that survive or a portion thereof, whatever portion you calculate would survive in the Dense Pack mode is a sufficient military deterrent?

Secretary WEINBERGER. I would stand on my previous answer, Senator.

Senator BIDEN. OK. Now, why do we not consider, or have we considered other means of meeting that requirement? For example, would 300 Minuteman III missiles, with three RV's each, based in a Dense Pack deployment meet that requirement?

Secretary WEINBERGER. I do not think so because you would not have the accuracy with those missiles and you would not have the hard target kill capability with those missiles.

Senator BIDEN. Because you would not have the accuracy?

Secretary WEINBERGER. Right.

Senator BIDEN. Now, with an MX guidance system——

Secretary WEINBERGER. You would not have the accuracy or the yield.

Senator BIDEN. With the MX guidance system, the accuracy of an MX which I am told that we would be capable of doing, would we then meet the same military requirement, with Minuteman, the same number, the same number of warheads, the same accuracy as without the same yield? Would that meet the military requirement?

Secretary WEINBERGER. I guess I did not get the first assumption there. Are you putting these Minuteman where they are?

Senator BIDEN. Dense Pack.

Secretary WEINBERGER. So the only thing you are doing is stopping the production of the MX and using the Minuteman missile.

Senator BIDEN. Correct.

Secretary WEINBERGER. I am persuaded that that would not give us the degree of retaliatory capability that we feel is essential and that we would get with the MX missile.

Senator BIDEN. Why?

Secretary WEINBERGER. Because, again, you do not have the hard target kill capability. You do not have the yield.

Senator BIDEN. Even with the increased accuracy? Even if we increased the accuracy, which we are capable of doing?

Secretary WEINBERGER. That is my understanding.

Dr. DELAUER. There is a slight difference in the way the MX missile is made hard. Not only is it in the silo in placement, but it is also the way it is encapsulated, the way it is suspended, and the way it is designed. The Minuteman missiles are not designed for that kind of structural load. They are just not hard enough. The system has to be completely hardened from outside in. So the missile itself is just not hard enough.

Senator BIDEN. My time is up. I will wait until my next round.

The CHAIRMAN. Thank you.

I just have one final question. On the compromise that was reached, Mr. Secretary, does the new MX compromise permit you to study all options now, including putting missiles in existing silos?

Secretary WEINBERGER. It requires a certification by the President on March 1, and I will get the exact language here: That the President shall consider, among other things, the military capability of the system or missile, the survivability of the system given current projected Soviet threats, the projected cost of the system, the impact that deployment of the missile may have on present and future arms control negotiations and siting considerations. That is the kind of

report he would submit, and he would also be required to reaffirm the selection of the close-spaced basing or propose an alternate. Those would be contained in the document that he is required to send in by March 1 following which, if Congress wants to do it, there would be full consideration of it and then a required vote.

The CHAIRMAN. Thank you very much.

Are there further questions?

Senator PELL. Yes.

First, with regard to Dense Pack—and I realize we have covered some of this ground before—but am I correct in saying that of the five members of the Joint Chiefs of Staff three members recommended against it?

Secretary WEINBERGER. No, sir. Let me go through that again. I have done it, and let me try it again.

Senator PELL. I think you said they had reservations.

Secretary WEINBERGER. First of all, all five supported constructing, procuring, and fielding the MX. Nobody had any doubt about that whatever. Two of them favored the system proposed by the President. One made no proposal but suggested that there were some problems with the deployment. Undoubtedly there are, as we have said. Two felt that because of the uncertainties that were referred to a moment ago, it would be better on an interim basis to put them in Minuteman silos. Of course we had to point out, as we did, that that was forbidden by the Congress. One of the two said that if it would be a help to the arms control negotiations, that despite his reservations, we should go ahead. All of them said that their reservations did not go so deeply that they would oppose the system, and if the President chose that, they would support it. That is what happened, and that is what is the case now.

But perfectly honestly, perfectly conscientiously and correctly, they pointed out to the President some of the problems that they say in this and some problems which unquestionably exist. The only thing that was suggested as an alternative was to spend more time trying to develop a better system if you could, and meanwhile produce the missile, deploy it, get it in the ground, and put it in those Minuteman silos that the Congress said we could not do.

Senator PELL. Was the President informed of the reservations?

Secretary WEINBERGER. Yes, sir. Absolutely.

Senator PELL. Thank you.

Now, in connection with Dense Pack, as I understand it, you did not propose to have an ABM system around it.

Secretary WEINBERGER. That is not an initial proposal. It is designed so that if need be—and when I say if need be, I mean if the Soviets start taking the counters that they can, they will be deployable without additional design work. That is the status of that.

It may be necessary. If it is, we design for it from the beginning. We do not have to deploy it from the beginning.

Senator PELL. If we do that, we recognize the fact that we would have to abrogate or violate the ABM Treaty and protocol.

Secretary WEINBERGER. No, sir. I would deny that completely. I think the only thing that would have to be done would be that we would have to change a previous unilateral declaration that we made that we were going to deploy one of the permitted systems in North Dakota and instead we would be deploying it in Wyoming.

Senator PELL. But as you probably recall, in article II of the treaty it says that if there is any move made on the part of the United States, it has to be in an area centered on its capital.

Secretary WEINBERGER. My understanding, Senator, is we were allowed the choice of the national capital or one site.

Senator PELL. If the choice is made to move, we cannot go from the present missile site to a second. We could only move the ABM complex to the national capital.

Secretary WEINBERGER. That is not my understanding, sir.

Senator PELL. I would be interested why you think I am incorrect in this interpretation. Or maybe you would like to refer to your expert laymen.

Secretary WEINBERGER. Senator Pell, we went over this very carefully with the State Department, the Arms Control and Disarmament Agency, our own attorneys and our own personnel responsible for the negotiations and the negotiating history. We have gone over the negotiating history very carefully. We have promised this committee a discussion of those legal questions. Essentially at the time of the negotiations it was not assumed that we would go elsewhere, but there is nothing in the treaty text nor in the negotiating record that precludes our going to another site. In fact, it is made quite clear that the Soviet Union has a choice of ICBM sites. It is not simply one choice, but it is a choice of one place.

The treaty itself is silent on the subject, sir.

Senator PELL. Well, as I read it, article II of the 1974 Protocol sets forth the right of each party to dismantle or destroy its single ABM site and build one other in its stead, as permitted in article III(a) of the 1972 treaty. In our case, the basic point is that the Grand Forks site could be exchanged only for an ABM site at the capital. However, I guess this is what lawyers are hired for, to give both sides of it.

I think we are getting into a very questionable situation of me doing what the Soviets are doing and figuring out where.

Secretary WEINBERGER. Senator, it was by unilateral action, not part of the treaty process but by unilateral action, that we nominated Grand Forks, N. Dak. As you know, we terminated the activities there. There is nothing that any of our people who have examined this—arms control experts, people who took part in the negotiations, and attorneys—can find that to suggest it would violate the treaty for us to move the previous deployment site, which is not now in use from Grand Forks to Wyoming.

Senator PELL. My time has expired. I want to come back.

The CHAIRMAN. Why do you not finish up, please.

Senator PELL. Thank you very much.

The CHAIRMAN. Mr. Secretary, how is your time?

Secretary WEINBERGER. It expired half an hour ago, Senator, but I can continue.

The CHAIRMAN. How about 8 or 10 minutes from you, Senator Biden?

Senator BIDEN. That would be fine.

The CHAIRMAN. So we would be finished before 1 o'clock.

Secretary WEINBERGER. That is fine.

Senator PELL. In addition to that, you have the SALT I Interim Agreement and SALT II, which obligate each side not to start con-

struction of additional fixed ICBM launchers. As I understand it, you try to get around that by saying Dense Pack involves missiles in canisters placed in silos, not launchers.

Secretary WEINBERGER. We do not get around this, Senator. The system we had proposed does not violate it. The system we proposed does not violate it because it is not a fixed silo system. It is not a mobile system. It is a system which is capable of being moved to another silo and is entirely fired and launched from within the canister and not by means of the silo. The silo is simply an enclosure for it. That is all.

Senator PELL. I realize that this is your interpretation of the launcher construction problem. With regard to the first issue, the ABM system, I would be very interested if your lawyer could submit for the record his rationale as to why it is not a violation of the ABM Treaty and protocol.

Secretary WEINBERGER. We will certainly do that. We will give you all of the bases upon which we conclude that it does not violate either treaty. I would not likely testify here before you that it does not if I were not absolutely convinced that it does not.

Senator PELL. I am sure it will not be wasted effort, because undoubtedly you will have to prepare the same brief for use in Geneva.

Secretary WEINBERGER. They have it and are fully in agreement, sir.

Senator PELL. Would you consider a hundred new Soviet missiles in a complex like Dense Pack consistent with SALT if they did this?

Secretary WEINBERGER. If it were precisely the same system, yes. One of our problems with SALT II, as I have said, is that it does nothing to restrain the Soviet buildup that has been going on and continues to go on.

Senator PELL. In the past 2 years in connection with the MX, over the last 18 months was any serious thought given within the administration to abandon MX?

Secretary WEINBERGER. No, I do not think so, sir. We did look at the possibility of a common missile, submarine and land, and we concluded on the basis of the best scientific and technical advice that we could get that the commonality would only be about 20 percent; that there would be no significant savings; and in fact there would be a loss of effectiveness. So we went back and abandoned that basic idea although I had been strongly attracted to it on the ground that I hoped it would save a lot of money if we could make a common missile for both submarine and for land. I am convinced now that unfortunately we cannot and that we would lose a great deal of effectiveness of both deployment modes without any saving at all and certainly with an increase in time spent.

Senator PELL. And also perhaps with an increase in stability of the international situation if they are in submarines.

Secretary WEINBERGER. Yes.

Senator PELL. Because I am always reminded of the saying that we should put the weapons out to sea where the real estate is free and far from you and me.

Secretary WEINBERGER. We have done that, and we should continue to do that. We will have them at sea by 1989 in a mode in which we will have a hard target kill capability that will regain a great deal of the

deterrent for us. We would not want to abandon that for a moment, but we need the redundancy and the strengths that the other two legs give us.

Senator PELL. Thank you very much.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Biden.

Thank you, Senator Pell.

Senator BIDEN. Thank you, Mr. Chairman.

Shifting from central systems to theater systems for a moment, Mr. Secretary, as you have asserted time and again here, the administration has a strong commitment to arms control, but as you know very well, notwithstanding how strongly that commitment is held, there is a large body of opinion not only in this country but in Europe which doubts that commitment.

Secretary WEINBERGER. I would certainly question the latter statement, sir, because I think that there is a strong element of public opinion in Europe and the United States that does not want a nuclear war, and we share that completely. There are different views as to how you go about it, and the freeze movement, both in Europe and here, is a movement which we think is very dangerous.

Senator BIDEN. I am not talking about the freeze movement.

Secretary WEINBERGER. I do not think there is any lack of understanding of the administration's commitment to arms reduction.

Senator BIDEN. Well, I just came back from a NATO conference, and I can assure you that from the CDU members in Germany straight through to the Socialist members from France, there is a serious doubt about your commitment. I am telling you it is a doubt.

Secretary WEINBERGER. I just came back from a NATO meeting in Brussels and had the opportunity to consult with Chancellor Kohl and Defense Minister Werner and others, and I do not sense any of that, sir.

Senator BIDEN. Well, let me try another way. The 1979 decision is in jeopardy. Would you agree with that?

Secretary WEINBERGER. No, I would not use those terms. The 1979 decision, the two-track decision, is supported by the beginnings of deployment and construction in the required number of countries. There are certainly a large number of people in various countries who would like to abandon it, but at this point I would not say it is in jeopardy. I would say that it is essential that we continue to pursue the production, as we are doing, with both the Pershing IIs and the ground launch cruise missiles to get them there on time, and that we do everything we can to ensure that there is a recognition of the desire for a zero-based option and to negotiate that seriously. We are doing both those things.

Senator BIDEN. Let me start from the back and work my way forward. I happen to agree with you that there it is absolutely essential for us to continue to move toward the deployment date and the ability to deploy both the Pershing II and the cruise missile in Europe.

I am telling you, though, that I am not the only one who has growing concern that our European friends are not going to comply with their side of the bargain that was reached in 1979. And further, that one of the reasons for that is that they are under great political pressure within their constituencies, as is demonstrated in Belgium and as

is demonstrated by the Danes, and as has even begun to be demonstrated in Germany.

There is great and growing concern by the politicians like me in those countries that their jobs are on the line. None of those governments are in a secure position in terms of overwhelming majorities in their parliamentary bodies. Each of them fears that unless they can turn public opinion around or continue it on the thin edge of support that exists now, that there is going to be some trouble.

Now, my concern is that we are not taking advantage of an opportunity to move European public opinion, and one of the ways I believe we can move European public opinion is at this moment there is a study being performed by the high-level group in NATO headed by an American regarding short-range battlefield weapons. And all the expert testimony I ever heard in this committee, or in the Intelligence Committee in dealing with NATO questions, they have all said these battlefield range, short-range battlefield weapons are not very useful systems.

I suspect when the study is done, although I do not intend to prejudge it, that we may very well find the study concluding, military men concluding that they are not particularly useful weapons. Since I am obviously not going to get a responsive answer from you, let me just make the suggestion—and if you want to comment, please do—the suggestion would be that if, in fact, the high-level group concludes that the utility of battlefield weapons in Europe is negligible, I would strongly recommend that the administration use its leverage within that group to unilaterally do away with those battlefield weapons that we will conclude are of no real value to us in order to shore up European public opinion to allow the politicians like me to make what is going to be an incredibly difficult decision for them to actually finally vote to put the Pershing II and/or the cruise on their soil.

You can comment if you want, that is fine, but you do not have to answer me. You do not have to say anything if you do not want.

Secretary WEINBERGER. Let me give you an answer, Senator, that will be completely responsive in my opinion.

You start out with the assumption that the whole plan is in jeopardy, and I disagree with that. I do not think that is being nonresponsive, but I do think that there are certainly concerns about it, and I have sensed these.

I think it is relevant and important to point out that as recently as 2 weeks ago, the NATO defense ministers unanimously reaffirmed the desire and the willingness to deploy these systems. A week ago the NATO foreign ministers meeting in the North Atlantic Council did exactly the same thing.

These are all politicians. These are all people who have to face electorates and who know the strength of the opposition movements within their countries.

You certainly are correct that two of the governments are minority governments and there are unquestionably grounds for concern with respect to the continued strength necessary to carry out both tracks of that decision.

In response to the latter part of your suggestion, I certainly would have no indication whatever that a decision to abandon battlefield

nuclear weapons would do anything to shore up the types of opinions or the groups of opinions that are being expressed with respect to the deployment of the Pershing II. I do not think it would have any effect on them whatever.

The people who oppose the deployment of that, basically oppose most deployment of most weapons and are not much interested in regaining conventional strength. It is their hope for the most part that if we freeze immediately, the Soviets would do the same thing and that we would then be able to proceed at a perhaps more rapid pace toward genuine arms reduction.

Our fear is that unless the Soviets agree to come down in a fully verifiable way to the same limits that will constrain us that we will not get a continuation of the kind of deterrent strength and deterrent posture that has, as I have said, preserved the peace of the world all these years.

We all want the same objective. What the President wants to do is to get rid of all of the intermediate-range weapons, and he is negotiating that seriously. I cannot for the life of me see how a proposal by him to do that can be viewed as a lack of commitment to arms reduction. I think it is evidence of the strongest possible commitment that has been expressed by any administration.

Senator BIDEN. The Pentagon is developing a whole range of cruise missiles—air launched, sea launched, ground launched, both nuclear and conventional. What measures are you taking to insure these systems could be limited and verified by future arms control agreements? Are they being built with FRODS now? I mean is that part of the plan? That is, functionally related observable differences?

Secretary WEINBERGER. I think, first of all, if that should be the result of any arms reduction agreement, it is the easiest thing in the world to add. They would be verifiable in that sense. Bear in mind that my feeling is that you are never going to have full verifiability unless you have onsite inspection, something that we have always offered, something the Soviets have always refused. It says quite a lot about the difference between the two systems to recall that. But there is no system that is being built that could not be full verifiable or made so, even to such highly technological scientific advances as painting a red stripe on it. There are all kinds of ways you could do this, but it does require verifiability, and, I think, onsite inspection on both sides.

Senator BIDEN. Well, let me conclude, Mr. Chairman and Mr. Secretary, by saying that I want you to understand at least the relation to the theater systems. I strongly support the 1979 decision. I delivered a paper and a resolution at the NATO meeting on that encouraging that position to be taken.

But I just suggest to you whether or not it is needed in terms of whether or not it is justified, there is a need, in my humble opinion, for the administration to take additional action in order to deal with European public opinion, or else we will find that our European brethren do not have the political will to do what must be done.

Secretary WEINBERGER. I agree with you that there are grounds for concern, Senator, and I suggest that the path that we are on with respect to arms reduction is a path that initially has produced very good reaction in Europe. As I mentioned, all of the NATO ministers

thus far have considered it and reaffirmed the importance and the necessity, as you just have, of carrying out that decision. We would certainly want to do everything we could to maintain the necessary public support for that.

Senator PELL. Mr. Chairman.

The CHAIRMAN. Senator Pell for 1 minute for a statement.

Senator PELL. I just wanted to say that at 4 o'clock this afternoon in room S–207, my old colleague, Senator Pastore with his son, Dr. John Pastore, will be showing the film, the TV interview that Dr. John Pastore gave when he was in the Soviet Union concerning nuclear strategy. Senators and the press are invited to the 4 o'clock showing. Staff is invited to the 5 o'clock showing.

The CHAIRMAN. One request, Mr. Secretary. If you could provide the committee with copies of the September 22d Townes letter and the Defense Science Board report on Dense Pack, that would be appreciated.

Secretary WEINBERGER. That letter has been supplied in classified form, and we would supply it in that same classified form.

[The information referred to is classified and in committee files.]

The CHAIRMAN. All right. We would appreciate that very much.

If there is no further business, the meeting is adjourned, and we very much appreciate the appearance of you and your colleagues, Mr. Secretary.

Secretary WEINBERGER. I appreciate the courtesy of the hearing, Senator. Thank you.

[Whereupon, at 1 p.m., the hearing adjourned, subject to call of the Chair.]

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